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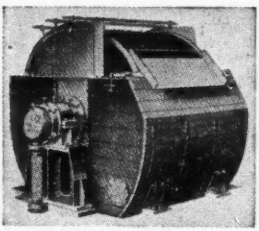

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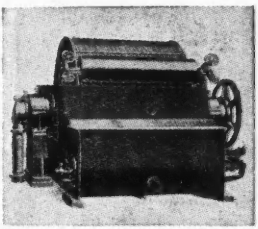

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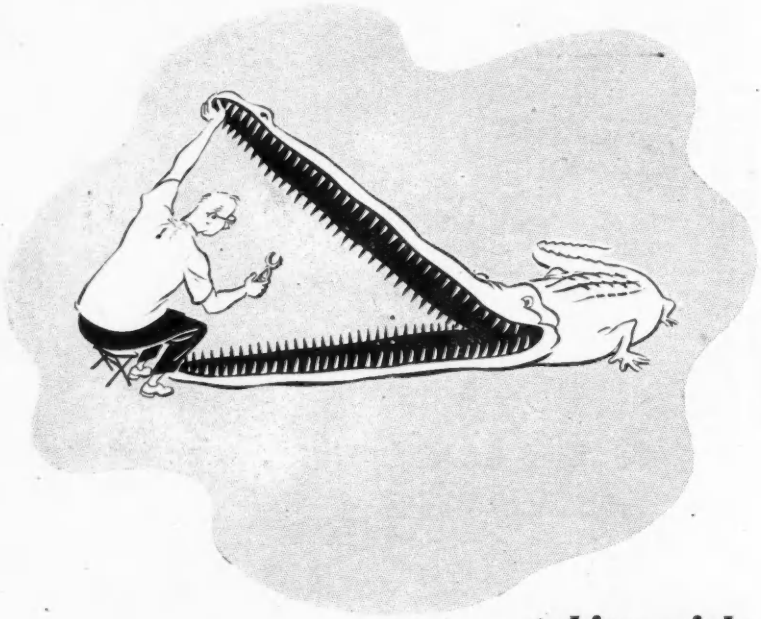

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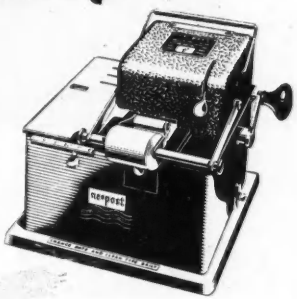

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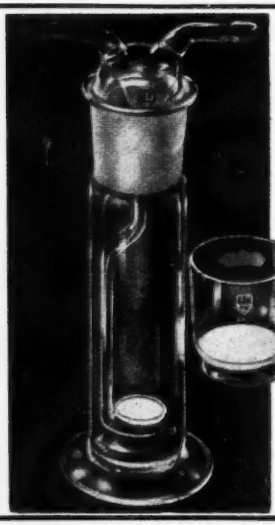

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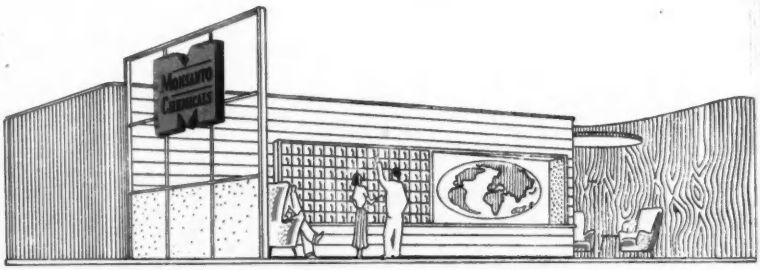

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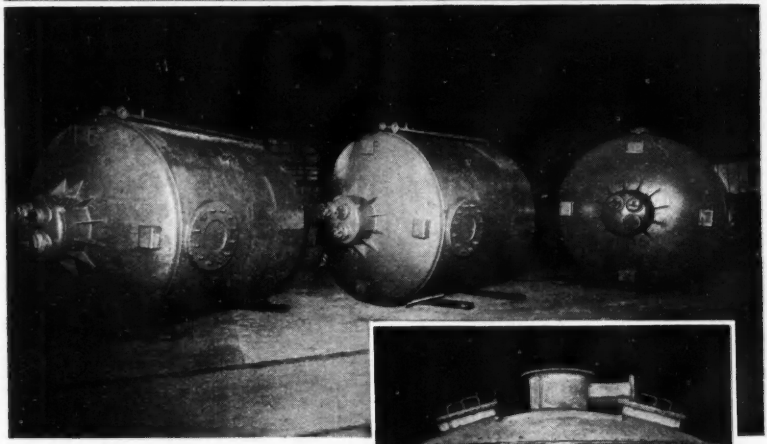

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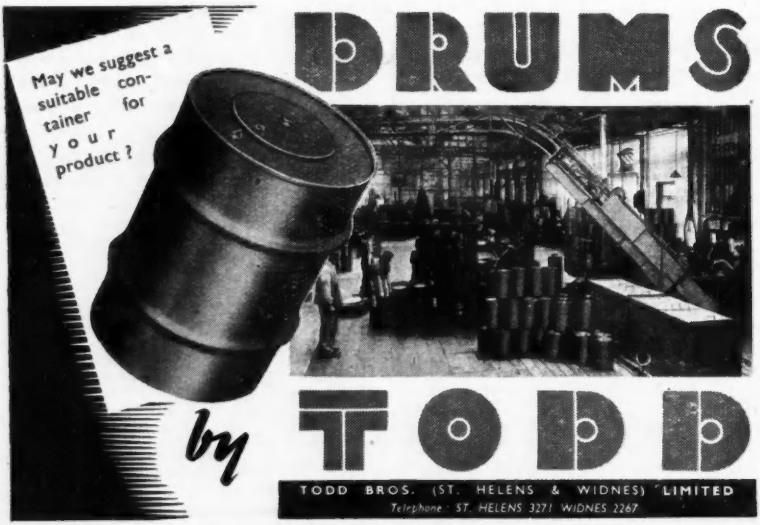

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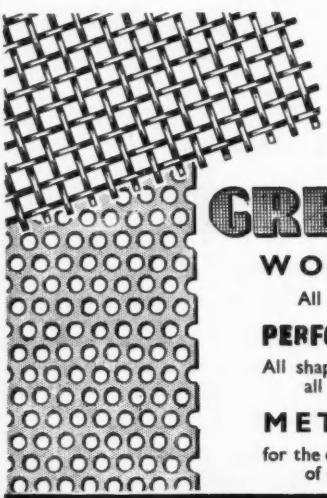

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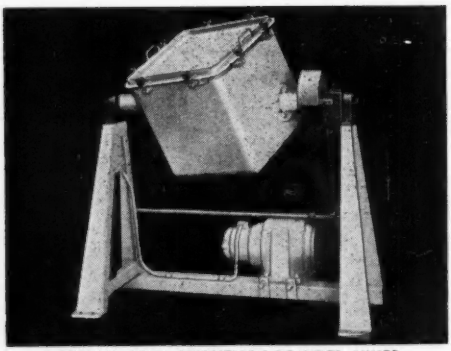

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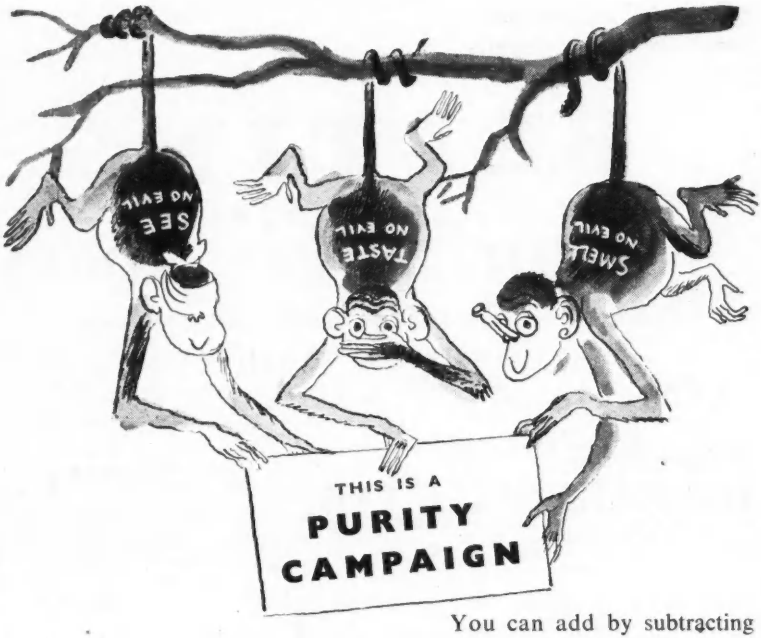

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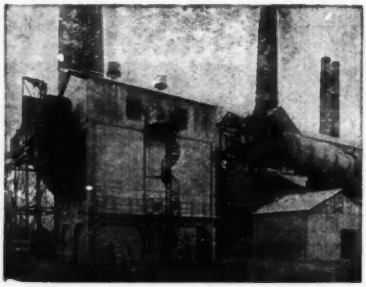

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3 April 1948

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High Level Liaison

THE history of advanced post-school or post-college education, if it were written, would probably show as one of its outstanding characteristics initial doubt or positive hostility on the part of the employer, followed at a later date by his enthusiastic approval. There have been learned and technological societies in being for a great many years and generally they have enjoyed the support of individuals and of the more enlightened firms. There have been firms, however, which have not approved of their staff meeting in open discussion members of rival organisations. We recall one society that flourishes now in the sunshine of official recognition which had a very hard time to get started because of the opposition of employers. We recall also an occasion, typical of many, when a man holding a managerial post was informed by his managing director that he disapproved of him attending a meeting of the Society of Chemical Industry on the ground that if he spent his evenings in the local meetings of that society he could not be attending to his work!

The foregoing represents one view, fortunately more or less defunct, on the desirability of what is now generally called liaison. To-day, the importance of hearing the opinions of colleagues and perhaps potential competitors is widely recognised and those who are deprived of that facility are undoubtedly handicapped.

A very interesting account of a new development in this field is contained in a paper by Prof. Sune Carlson in the "Skandinaviska Banken Quarterly Review". The experiment was undertaken because it was recognised that there is plenty of opportunity for the study of business management, *until one reaches the top*. The chief executive generally finds himself with more problems than ever to solve and no guidance other than his native wit, early training and subsequent experience. There is, moreover, generally little opportunity of discussing problems with others equally well informed. Thus there is little research and practically no literature in this field and no organisation for continued study. These were the problems which initiated in Sweden the experiment that is the subject of Prof. Carlson's paper.

A group of Swedish business men formed an informal organisation devoted exclusively to research and discussion of "top-management" questions. Now, after nearly four years, the "Administrative Problem Study Group" is still quite as active as ever. The fact that it has survived for that length of time indicates that it has been of value.

Its ordinary members are the chairmen of 13 important, and non-competitive, business firms concerned with banks, insurance, gold and coal mining, pottery, iron and steel, textiles, printing, brewing, mechanical engineering, transport and so forth. The group has as co-ordinating officer a research director and two assistants, all part-time. Associated with the group is a second study group consisting of the office and personnel managers of the same companies. In view of the impor-

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tance of management in British industry, it may be of interest to describe how the group operates.

The members meet regularly three or four times a year for a full day's discussion of a selected administrative problem. It is the function of the research director to plan these discussions and to collect and analyse all necessary material. As soon as the problem for the next discussion has been selected, the director and his assistants start to collect all pertinent information that can be obtained from the literature in the field.

A detailed questionnaire is drawn up and sent out to members who are asked to report everything they have done or planned to do with respect to the problem in hand, a task which often requires extensive investigation. While this work is going on the firms are usually visited by the research director, who, even at this preliminary stage, can ask questions and get information on different points which might otherwise be overlooked. In some cases the members prepare a copy of their report or some other material of interest for all the other members, while in others they send for the director's use one copy only.

It is the task of the director to summarise the findings in a general report, which, together with other material available, is sent out to the members before the group meets. The director also has to prepare a detailed plan and timetable for the coming discussion. When the members finally meet, all are well prepared for full discussion and, as the group is small and the members are all well acquainted, frankness is possible.

This Swedish enterprise has the germ of an idea, to say the least of it, fit for wider application. Leading executives in this country certainly have the same need to discuss some of their peculiar problems in a less formal atmosphere than the average employers' conferences provide. Conscious though we all are of our own value, there are few who cannot gain new ideas from the stimulus of open discussion.

The appeal, however, is deeper than this. We have all observed how comparatively small are the numbers who attend many technical meetings. May it not be partly because they do not hear the sort of authoritative information that they require? Would it serve a useful purpose if there were fewer meetings of scientific bodies for the purpose of hearing papers and more for discussion of some particular problem? Would it not be valuable if a research director (part-time) were asked to study a particular problem, with assistants, and to present his report in advance of a meeting at which it would be studied, not just for an hour with extemporary speeches, but by experts whose remarks would be carefully prepared in advance?

S.C.I. (Edinburgh) Annual Meeting.—At the annual general meeting next July of the Edinburgh and East of Scotland Section of the Society of Chemical Industry, Dr. I. A. Preece will lecture on "Brewing" to the Food Group. Other lectures will be "Papermaking" by Mr. S. R. H. Edge; "Fisheries" by Dr. G. A. Reay; and "Research Developments and Applications to Textile Industries in East Central Scotland," by Mr. H. Corteen.

NOTES AND COMMENTS

Reparations—On Paper

THE hope that chemical industries in this country would benefit substantially from the widely announced four-Power plan for the redistribution of much of Germany's war potential in the form of reparations appears to have been largely illusory. While there is, of course, no proof that the expected benefits will never materialise, what little evidence there is of actual deliveries in this country had already compelled the conclusion that if any substantial body of plant or tools had left Germany it most certainly had not been directed here. The latest indications, furnished in the second annual report of the Allied Reparations Agency, are that very little plant has been directed from Germany to any destination—except possibly to the U.S.S.R., which preserves its accustomed secrecy about this as about almost every other matter of international concern. The successive phases of the reparations story are illuminating when seen in retrospect. In 1946 it was announced with some confidence that 1600 plants, a very substantial proportion of which were of direct use in chemical production, would be distributed among the 18 nations entitled to benefit. A year later the total had been reduced to 858, including 176 plants in the French zone. Both those, moreover, were paper totals; in 1946 the 18 signatories of the Paris reparations agreement received just 31 plants; in 1947 they got 197. That is not the entire story; a good deal of Germany's industrial and munitions equipment took root in neutral countries, as in Switzerland, where most of it still is regardless of agreement to distribute it. The general conclusion is obvious. The great bulk of equipment surplus to Germany's peaceful needs is still where it was during war. Strangest anomaly of all is the news contained in the newly released report of a U.S. mission which has been in Germany surveying the iron scrap position. According to this group there are at least 10 million tons of scrap available there and reference is made to the existence of an "understanding" among scrap dealers not to let the metal leave Germany.

Success Story

IF doubt still lurks in the administrative mind of what some branches of chemical industry can do to redress the balance of payments, besides serving the national interest in other ways, if it is given sufficient material and labour, some facts presented by Mr. Kenneth M. Chance to shareholders of British Industrial Plastics, Ltd., should dispel it. Some of the plastics which the company is sending to the Continent fetch higher prices than are usually available in this country and are yet lower—in one case 50 per cent lower—than those of competitors who are selling all they can make of similar products. That is the sort of good news of chemical industry to which all too little publicity and credit is given. That, moreover, is only one of the solid benefits which efficient management and technology can produce when the burden of material shortages is relieved. One of the company's moulding powder plants has trebled its 1939 output, using its old equipment, with very little increase in the charges for fuel and power, despite the fact that coal has doubled in price. At a resin plant the labour cost per ton has been reduced by 40 per cent, although workers' individual earnings are twice as large as in 1939; and home prices of one plastic cement are 1.75 per cent below the 1939 level. This firm's direct exports last year—to 23 countries—were worth £400,000, and buttons made from its moulding powders made nearly as much foreign currency. "We look to our export trade," said Mr. Chance, for a substantial proportion of the increased profits which will follow the receipts of ample raw material. Are we to reduce our prices and diminish the revenue received from abroad in order to reduce the meagre amount of 3.2 per cent on our turnover paid by way of dividend?"

Conflicting Counsels

IF there is anything that the chemical industry has special reason to abominate it is conflict of opinion with Government departments in such important matters affecting production as the supply of raw materials, fuel and power. Putting oneself figuratively in the shoes of a chemical works manager, intent on securing that

there is no repetition next winter in his works of the creeping paralysis which recurrent power shortages have caused, affords a remarkable insight into the prevalent examples of diverse advice which an executive has at his disposal. He might be forgiven did he resort to a fortune teller. A few days ago THE CHEMICAL AGE received from an advertising organisation in the West Country, sales literature which sets forth impressively reasons why manufacturers should consider installing diesel-electric generating plant. Such matters as cost of installation, tax allowances on depreciation and obsolescence, etc., are drawn up in tabular form for easy assimilation. A special section is devoted to explaining why oil is the best source of power. Adequate supplies of fuel, it is stated, are assured by the Ministry of Supply. That is one side of the picture.

Other Views

THE other is reflected in the statement of the Fuel Minister that firms have been asked to suspend conversion of coal-burning plant to oil-burning (and this is understood to relate also to all forms of oil fuel) owing to the prevailing uncertainties of the supply position. Interviews with the Supply and Fuel Ministries have served to emphasise that intending purchasers of oil-burning electric plant would be well advised to seek Government advice. Finally, to give a further controversial twist to the conundrum, the Central Electricity Board, in its 1947 report published last week-end, gives a very plain hint that renewed power shortage is likely to be the result of the present policy of curtailing expenditure on electricity generating plant extensions.

Prospects for Peroxide

TECHNICALLY, credit for much of the current recognition of the extraordinary potency as a fuel of hydrogen peroxide, which before the war was identified in most chemical practitioners' minds primarily as a disinfectant and bleaching agent, must be given to the scientists of wartime Germany, although the murderous use to which they enabled their discoveries to be put does not encourage the award of any laurels. First intimation received in this country at large of what vast reserves of energy can be released by the chemical reaction between very high concentrations of hydrogen peroxide and calcium permanganate was conveyed by the V-1 bomb and later the V-2 rocket, in which significantly the reaction was applied to drive turbine pumps. Now important applications of the principle to peaceful uses may be expected from our own official rocket research station in Buckinghamshire, although that institution, like most of its kind, has not so far been very communicative. In the U.S.A. the atmosphere of secrecy is, typically, less well preserved and some interesting data of a general kind have been given by two chemists of the Buffalo Electro Chemical Company, Messrs. G. G. Crewson and N. S. Davis, whose organisation is now producing 90 per cent hydrogen peroxide on a substantial commercial scale. No data, unfortunately, are yet available on the subject of production costs, which must regulate future development. The Buffalo chemists, however, have indicated some of the diverse and practical uses to which the new high concentrations of hydrogen peroxide—which they note is virtually a new chemical—permit, including the operation of small high efficiency power plants, where size and weight must be kept to the minimum, heightening the combustion efficiency of internal combustion engines and—almost inevitably—the production of explosive. Hydrogen peroxide when mixed with some organic solvents produces an explosive said to be as powerful as TNT and is, of course, incapable of doing damage until the components of the blasting formula are brought together.

Scandinavian Chemistry

Acta Chemica Scandinavica is a new Scandinavian scientifis chemical journal published by Einar Munksgaard, Copenhagen, Nörregade 6. On the editorial staff are Professor K. Myrbäck, Stockholm; Professor J. A. Christiansen, Copenhagen; Professor A. I. Virtanen, Helsinki; and Professor O. Hassel, Oslo. The journal will collate the results of chemical research in Denmark, Finland, Norway and Sweden and publish them in English, French or German. *Acta Chemica Scandinavica* will this year consist of ten numbers with some 1200 pages, costing $8.50 including postage.

Texas Havoc Repaired

Vast Expenditure by Monsanto

MR. Edgar M. Queeny, chairman of the Monsanto Chemical Company, announced at the annual meeting of the stockholders last week that the company's Texas City plant, a major unit in the firm's production of styrene for the plastics industry, which was destroyed last April when a cargo of ammonium nitrate exploded in the city's harbour, will be back in operation by June. The first unit in the Texas City installation, the ethylene plant, would be in operation as early as next month. An insurance claim amounting to $22 million is in negotiation.

Reduced Earnings

While the new Monsanto plant will have a somewhat smaller capacity than the one destroyed, it will embody design improvements, said the chairman. Decreased margins between costs and selling prices had been reflected in decreased earnings in the last six months of the year. Raw materials and other costs had risen 42 per cent and wages had gone up 79 per cent, while the firm's prices had increased only 15.9 per cent. In addition, the company invested $40 million in new plants in 1947. "Nowadays the cost of living is high," Mr. Queeny said, "but the cost of applied science to make that living better is higher than ever before."

Mr. William M. Rand, president of the company, reported that $27.5 million of uncompleted projects would begin operation during the coming year. "A large percentage of these projects," he said, "are for the production of entirely new products and for the expansion of service facilities such as power plants and warehouses."

STEEL ANALYSES

THE British Standards Institution has recently published Parts 3, 4 and 5 of B.S. 1121, "Methods for the Analysis of Steel." Part 3 specifies the method for the determination of tungsten in steels not containing columbium (niobium) and tantalum, and Part 4 specifies the method for the determination of aluminium in permanent magnet alloys, and Part 5 the method for the determination of copper in permanent net alloys. The solutions required, test procedure and method of calculation are specified for each method. Copies of these standards can be obtained from the British Standards Institution, Sales Department, 24 Victoria Street, London,, S.W.1, at a cost of 1s. post free.

New Chemicals Forecast

U.S. View of Atomic Possibilities

WHAT has already been achieved in the revelation of new elements and the significant new affinities displayed by other chemical substances after atomic bombardment in the cyclotron suggest that we are on the eve of producing chemicals hitherto unattainable. That is the view of Prof. Joseph W. Kennedy, chairman of the department of chemistry, Washington University, St. Louis.

Following nuclear transmutation—he told the St. Louis section of the American Chemical Society—atoms and molecules were left in a state of great excitation and often exhibited an extraordinary chemical activity that can not be induced by any means other than bombardment. Iodine atoms stimulated by gamma rays, for example, combined instantaneously with benzene, grain alcohol, and other chemicals to produce substances which are relatively difficult to make by conventional chemical methods. The excited iodine, moreover, reacts at temperatures as low as −195°C., where ordinary chemical activity is at a virtual standstill.

The sensitivity of chemical analysis has been increased a 100 million times by the use of radioactive isotopes as tags, the professor declares, and traces of chemicals far too scanty to be detected by the usual analytical procedures can be not only discerned but even measured accurately if radioactive materials are used.

Eight chemical elements have been produced artificially in the uranium pile and studied for the first time in extremely small amounts through observations of their radioactivity. Four of these new elements, numbers 93 to 96, extend beyond the limits of the old atomic table, and the synthesis of still more elements through nuclear bombardment is to be expected.

WORLD TIN ALLOCATIONS

THE Ministry of Supply has recently announced that further allocations of tin metal for the first half of 1948 have been made by the Combined Tin Committee. The quantity of tin metal now allocated to meet requirements for the first half of 1948 totals 33,246 tons, including the 13,940 tons now announced. The new allocations, together with those previously made are expected to represent final allocations for the first half of this year for most of the countries listed.

The largest recipients and the latest additional allocations granted them were: U.S.A., 17,850 long tons (+7650); France 4760 (+2040); India 2450 (+1050); Canada 1905 (+815). No other country will receive more than 870 tons (allocated to Poland).

German Iron and Steel

Reviving Production in Soviet Zone

ACCORDING to recently received reports on the development of the iron and steel industry in the Soviet zone of Germany, the Henningsdorf Steelworks, near Berlin, has been scheduled to resume production with a monthly output of 100 tons. This will consist chiefly of steel plate for export purposes, most of which will be earmarked for reparations. When it was decided to rebuild the works, plant was brought in from smaller works in Czechoslovakia and from other dismantled works in the Russian zone. It is understood that orders for certain items of equipment have been placed in Belgium.

Reconstruction of the steelworks at Riesa, and the starting of another blast furnace in the Max-Huette in Unterwellenborn in Thuringia have also been planned. The latter is at present the only works in the Soviet zone engaged in the manufacture of pig-iron, the output target for which amounted to 45,000 tons in each of the last two quarters of last year. In the fourth quarter, the Max-Huette works produced 30,500 tons of Thomas steel and 7500 tons electrosteel. This output is being supplemented by that from the Thale works in the Harz Mountains with 17,110 tons Siemens-Martin steel and 3800 tons electrosteel. These output figures demonstrate the rather unsatisfactory steel supply position in the Soviet zone, and it is stated that the authorities are expected to take further steps for the reconstruction of existing iron and steel works, without much regard to their economical operation.

U.S. COKE-OVEN ACTIVITY

THE report of coke-oven operators in the U.S.A. indicates that a new peacetime record of 73 million tons of coke were produced in 1947. This was an increase of more than 24 per cent over the 1946 output. Data on new coke ovens constructed during 1947 indicate that 533 new ovens with an annual capacity of 2,789,000 tons were placed in operation. The increase in coke production was accompanied generally by an increase in output of the principal coal chemicals. Production of ammonium sulphate increased 27.5 per cent over 1946, ammonia liquor 2.9 per cent, benzol (all grades) 16.8 per cent, toluol (all grades) 65.6 per cent; xylol 20.5 per cent, solvent naphtha 14.2 per cent, tar 23.4 per cent and creosote oil 56.3 per cent.

The demand for virtually all the coal chemicals was extremely heavy and shipments followed production closely. At the year end there were 86 active plants.

Japanese Oil from Coal

110 Million Gallons Annually in War

NEARLY 110 million gal. of Japan's wartime liquid fuel supply were made from coal by low-temperature carbonisation, it is revealed in a comprehensive survey* of this phase of the Japanese synthetic fuels industry during 1940-45, released this week by the U.S. Bureau of Mines. Crude oil production in Japan proper in the same period was 445,699,000 gal.

Ten carbonisation plants—six in Japan and four in Korea and Karafuto—produced 109,639,000 gallons of liquid fuel from coal. While most of it was bunker oil for ship's boilers, other products included aviation and motor spirit and semi-diesel oil.

The low-temperature carbonisation plants produced semi-coke that was used for cooking and heating, for fueling portable gas producers on motor vehicles, and for replacing imported low-volatile bituminous coal in coke-making. The peak annual production of semi-coke—in 1943— was 468,446 metric tons. War damage to the plants was so severe, however, that when they were visited between April and August, 1946, only three were in operating condition or so slightly damaged as to require only minor repairs.

The relationship between the industry and the Japanese Government, which began subsidising it in 1934, is fully described in the report, as are the processes used. The report describes each plant in detail—its history, equipment, operating difficulties, type of coal used, and output, including semi-coke, liquids, gas and other products. Operating costs and the present status of each plant are also outlined. Numerous tables, photographs, charts and diagrams supplement the text.

* Information Circular I.C. 7430, "Low-Temperature Carbonisation of Coal in Japan," the U.S. Bureau of Mines, 4800 Forbes Street, Pittsburgh 13, Pa.

Non-Ferrous Scrap Stocks

Ministry of Supply figures show that stocks of scrap on charge and available for disposals at the end of February, 1948, were 46,728 tons, subdivided as follows: copper and copper alloy, 12,638 tons; zinc and zinc alloy, 6459 tons; lead, 5692 tons; S.A.A. cases, 3249 tons; other grades, 18,690 tons. In January and February the total sales amounted to 17,911 tons, the approximate value of which was £1,500,000. Material put out to tender during the same period amounted to 6732 tons, of which 5395 tons were lead. During the period a further 12,512 tons, valued at £1,135,583, were involved.

Molasses and Solvents

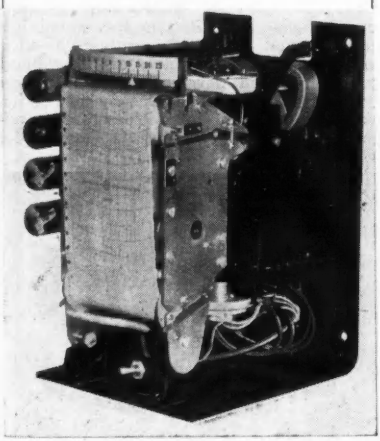
Wide Effect of Higher Values

THE Board of Trade announced on March 25 the anticipated increases in the maximum selling prices of molasses, industrial alcohol and solvents (THE CHEMICAL AGE, March 20). The new prices took effect from April 1.

The price of molasses is increased by £1 8s. per ton, of industrial alcohol by 3½d. per proof gal. and of methylated spirits by 6½d. per bulk gal. Other increases range from ½d. per lb. for acetic anhydride to £48 per ton for butyl alcohol. The price of acetone, however, is reduced by £10 per ton.

Representative new rates for various quantities and grades are as follows: Alcohols, 2s. 6d.-2s. 11½d. per gal.; industrial methylated spirit, 4s. 9d.-5s. 5d. per gal.; acetone, £75-£77 10s. per ton; amyl acetate, £173-£178 10s. per ton; butyl alcohol, £188-£191 per ton; glacial acetic acid (98-100 per cent), £79-£81; acetic anhydride, 11d. to 1s. 0½d. per lb. The Molasses and Industrial Alcohol Order is available from HMSO.

BETTER WELDING CONTROL



New photo-electric recording wattmeter for analysing welding circuits, measurement of heating and motor-starting loads, power surge, and for similar applications. This instrument was described in greater detail in THE CHEMICAL AGE, March 27. It is a product of the (U.S.) General Electric Company

Chemicals for Argentina

Soda Ash the Largest Shipment

FULLER details of the trade agreement recently signed in Buenos Aires between Britain and Argentina (THE CHEMICAL AGE, February 21) have now been made public by Government Circular Cmd. 7346.

Foremost, quantitatively, in the list of 23 chemicals to be sent to Argentina is soda ash (20,000 tons), caustic soda (16,500 tons), sodium bicarbonate (30,000 tons), and creosote oil (1600 tons). The complete list is as follows:—

Caustic soda	16,500
Soda ash	20,000
O-dinitro-cresol	200
DDT	300
Aniline dyes, synthetic	150
Sodium sulphide	900
Cresilic acid	540
Toluol	200
Creosote oil (for preservation of timber)	1,600
Ultramarine blue	125
Potassium cyanide	20
Potassium ferrocyanide	20
Potassium tartrate and bitartrate	35
Potassium iodide	10
Calcium chloride	250
Barium carbonate (in natural form)	200
Oropon	230
Sodium bicarbonate	3,000
Albayalde	500
Sulphanilamide	10
Sulphathiazole	14
Barium nitrate	30
Graphite and other electrodes	450

LIGHT OILS DEPUTATION

A DEPUTATION representing the largest body of industries using light hydrocarbon oils in the manufacture of their products, met Mr. Glenvil Hall, Financial Secretary to the Treasury, last week. It asked the Government to consider the abolition of the 9d. a gallon tax at present imposed on light oils when used entirely in manufacturing processes on the grounds that the tax was an unwarranted addition to production costs and a deterrent to exports. Mr. Hall undertook to place the industries' case before the Chancellor of the Exchequer.

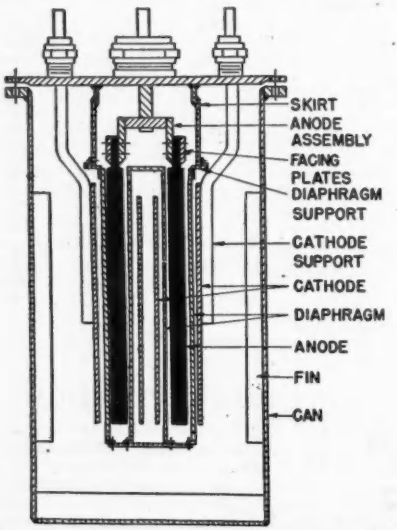
Agriculture's Need of Boron

Speaking at the fiftieth ordinary general meeting of Borax Consolidated, Ltd., in London, the chairman, Mr. D. Abel Smith, said that field investigations were continually adding to the list of commercial crops responding to boron. Walnuts, olives, and tobacco, as well as cereals and pasture plants, were the latest examples of crops deriving benefit from its use. High cropping demanded balanced manures, including minor elements such as boron, and this fact was not always fully realised.

FLUORINE: A NEW FACTOR IN INDUSTRY—I

By W. J. BULL

FLUORINE gas, which was first isolated about 125 years ago by Moissan, and was the sequel to 70 years of intense research by Faraday and his successors, is now regarded as being of great importance to industry. During recent years advanced requirements of energy control, and improved techniques in industrial production and chemical engineering have occasioned intensive work on fluorine and its compounds on a commercial scale. As a result, there have been produced new and valuable compounds for applied research in engineering and chemistry. Well-established fluorine compounds have also assumed a greater importance. For example, the U.S. production of anhydrous hydrofluoric acid rose from 5000 tons in 1931 to about 55,000 tons in 1945.

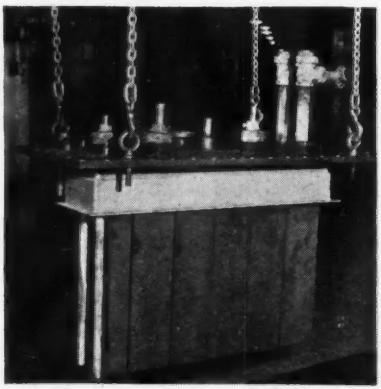


Constructional outline of the E. I. Du Pont carbon anode fluorine generator
(Courtesy Industrial and Engineering Chemistry)

Despite fundamentally important results already achieved, the full industrial significance of fluorine and its manufactured compounds is at present only in process of development. Certain diverse but well-defined angles of application are already becoming apparent. The Pennsylvania Salt Company, for instance, at its Whitemarsh research laboratories, has been working on a non-inflammable, non-toxic liquid with a high boiling point and specific gravity indicating the replacement of mercury vapour as a safe energiser for vapour engines of advanced design. The same company is producing an insulating gas by fluorine reaction, achieving practically 100 per cent insulation at the potentials requisite in nuclear physics and X-ray apparatus. Another product is a high-pressure, heat-resistant lubricant that remains chemically stable far beyond any known conditions encountered in modern engines or gears, and which will thus considerably extend design possibilities and the scope for energy transmission.

Stable Products

As a corollary to the extremely reactive character of the element, its compounds are generally notable for their stability. Besides those established industrial uses—such as fast and brilliant dyestuffs, "Freons," anhydrous hydrofluoric acid, catalysis (for example, in big-scale production of high-octane fuels), cryolite in the aluminium industry, and in textile processing—additional industrial products are now being investigated and developed. Among these are heat transfer and di-electric media, improved fungicides, insecticides and fumigants, high-stability solvents (some for



The carbon anode blades and ancillary metal anodes of a Du Pont fluorine cell
(Courtesy Industrial and Engineering Chemistry)

highly corrosive materials), fire-resistant and proofing substances, resins and plastics, and other materials of use in nuclear fission and analysis of molecular structures.

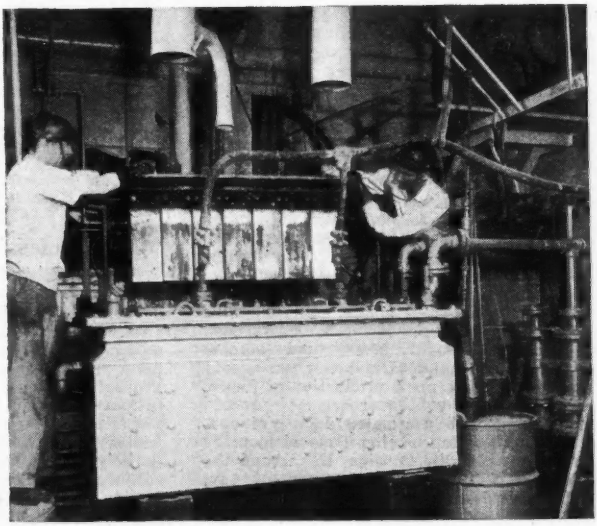
Evaluation of the industrial position of fluorine and the possible trend of the development of its unexploited compounds in relation to commercial chemistry is conditioned by various factors. Although one of earth's most plentiful elements, fluorine is unique by reason of its periodic position and its outstandingly electro-negative characteristics. Chemical manufacturing practice is therefore rendered more difficult by the unique functioning of the element's reactivity, and the diversity and qualities of many of its compounds, including substances of violent toxicity and extreme chemical inertia, as well as others that are non-toxic and more stable than any parallel materials of science or industry.

Other factors to be kept in mind concern its storage in steel containers or pipe systems. Fluorine is distributed in steel cylinders containing ½ lb. at 400 lb. pressure under Teflon gasket sealing, or in copper (both these metals develop a protective fluoride coating); it combines to the highest valency with other elements.

The unprecedented heat of disassociation of the fluorine-carbon or hydrogen bonds and the generally violent reactivity of fluorine can be controlled, within practical limits, in the vapour phase by conducting fluorination in contact with suitably designed metal screens or while enmeshed in metallic packing. Methods have been developed enabling conversion of hydrocarbons to fluorocarbons *via* chlorination and anhydrous hydrogen fluoride, with consequent economy over direct fluorination procedure. That compounds are initially in demand is evident. For example, the General Chemical Company, New York, is supplying nine groups of fluorine derivatives comprising 50 products ranging through alkali fluorides, fluorborates and organic compounds to acids, as basic chemicals for industry.

Commercial utilisation of fluorine until recently, has at least been restricted and its earlier investigation, largely in Britain, was marked by hazard and self-sacrifice. Sir Humphrey Davy in isolating chlorine from hydrochloric acid may be said to have indicated the first steps, while André Ampere predicted to-day's method and Moissan first actually produced the element through electrolytic decomposition of potassium fluoride in hydrogen fluoride. The first embryo for to-day's design for fluorine production was evolved by Poulenc and Meslous in 1900, modifications in line with Argo and co-workers' discoveries were incorporated some twenty years later. Chief problems arise through the readily reactive character of the elemental gas.

(*Continued overleaf*)



One of the 2000 amp. fluorine cells employed by the Hooker's Electrochemical Company. It employs the industrial type plate anodes

Fluorine reacts strongly with most metals at moderately elevated temperatures, with silicon-containing compounds, and will initiate continuous combustion of asbestos or glass; it combines violently with water to form hydrogen fluoride-oxygen and oxygen fluoride, and the heat of its reaction with hydrogen is 5½ times that of chlorine-hydrogen. It replaces chlorine in the solid metallic halides.

The atomic structure is a nucleus with a positive charge of 9, atomic weight 19, a disposition of 2 inner electrons and 7 outer electrons. The rapid production of a protective film enables the gas to be handled at normal temperatures in iron, copper, magnesium, nickel or monel.

Commercial Development

In light of these facts the immense amount of recent research and the practical application of fluorine production to industry in the United States commands especial interest because, owing to world economic and war conditions, it is lately here that fluorine has been made more largely commercially available, its properties more extensively applied than elsewhere, and its production, handling and storage made practical. The availability of practical industrial scale generating apparatus has been evolved in relation both to the extremely reactive character of the element and the correspondingly remarkable stability and the recently enhanced industrial economy (fluoroborates in electro-plating, for example), of certain fluorine compounds.

Industrially, however, these compounds are still largely unexplored, they are new in potentiality, their economic significance not yet revealed and the synthesis of production and application still subject to inventive design and new technique.

Among important indications of their industrial significance are reported investigations into products, such as fluorocarbons and their preparation by catalytic process; economic fluorination of benzenes; gaseous diffusion processes for separation of uranium isotopes (this phase more intensively investigated); fluorination of hydrocarbons using metallic fluorides, themselves prepared from elementary fluorine. Cobalt, or manganese trifluoride, developed among other metallic fluorides in Germany some 25 years ago, have been thoroughly investigated (notably at the Johns Hopkins University), as agents in economic pilot plant production of fluorocarbons whereby the reactions proceed readily but with a greater degree of control, the first stage being from elementary fluorine to metallic fluoride, the second the substitution through the agency of, say, CoF_3, of hydrogen by fluorine in a nitrogen-diluted, vapour phase hydrocarbon.

This important and interesting development work, involved partially in preparation of UF_6 was reported recently under "Synthesis of Fluorocarbons," at the Fluorine Chemistry Meeting in Chicago of the Division of Industrial and Engineering Chemistry, American Chemical Society.

During the advance towards to-day's relatively commercially economic electrolytic disassociation of fluorine, intensive preliminary co-ordinated research was carried out, using comparatively small dimension single fluorine cells, the design of which was modified in relation to the various problems revealed in practice. Predominantly there was a tendency to excessive polarisation with consequent variation in current efficiencies, anode consumption with consequent formation of sludge, and much thought was devoted to devising means to secure continuous and controlled feed to electrolyte and means to secure operation within an acceptable temperature range.

These and allied factors were countered by various means, frequently during laboratory procedure. For example, it is established that design to promote circulation of the electrolyte in the cathode area together with the controlled feed rate to electrolyte diminishes polarisation, with consequent steadiness of current density and generating efficiency and maintenance of normal operative temperatures.

The electrolyte is a fused salt, proportioned mainly as KF 1.8-2.0 HF—anhydrous hydrofluoric acid and potassium bifluoride—to which may be added a percentage of a metallic fluoride, *e.g.*, lithium or aluminium. It is estimated that 2.5 to 3 per cent of added lithium fluoride results in around 1 per cent of lithium fluoride present and active within the electrolyte fused mass at 100°C. This small proportion lowers the solid phase so as to permit operation at temperatures below 100°C.

(To be continued)

"The Confessions of a Capitalist"

First published 23 years ago, "The Confessions of a Capitalist," a work on economics by their former chairman, which Ernest Benn, Ltd., is re-issuing in July is still near the head of the circulation list for a publication of this nature. More than a quarter of a million copies have been sold in fourteen separate editions in this country, including a large issue in The Readers Library when that popular sixpenny was at its height in August, 1928, in an American edition published by Scribner, and in foreign translations in German, French, Dutch, Danish, Swedish and Finnish.

WAXES AND KINDRED MATERIALS

Complex Functions in Printing Inks

A COMPREHENSIVE survey of the use of waxes and fatty materials in the printing ink and allied trades was given in a paper presented by Dr L. Ivanovszky and Dr. A. C. Healey to the London Section of the Oil and Colour Chemists' Association on March 18.

After outlining the chemical basis of the main types of printing ink media, namely, drying, non-drying and evaporating vehicles, the authors noted that waxes and fatty materials, in general, had found important uses in printing ink manufacture. Owing to the complex and overlapping composition of waxes and fats, any attempt to define the materials by their chemical nature was more confusing than useful. For the purposes of the paper the designations "waxes," "fats" and "oils" were used as consistency terms implying certain physical and technological properties.

Influence of Waxes

It became more and more an accepted fact that there was a close similarity between the physical properties of mixtures of waxes and related materials and that of alloys in the ordinary sense of the word. Wax blends, too, were capable of forming mixed crystals, singular crystals (which were regarded as chemical compounds), eutectica, etc., and therefore, showed all the other typical features of alloys. Thus the addition of waxes might have a very profound effect on the properties of inks and ink films (*i.e.*, prints), far beyond what would be expected from the small additions usually made. The dried printing ink film was to all intents a solid.

The authors questioned a statement that was often made in contemporary literature that waxes rose to the surface of an ink film in a print and consequently helped to prevent offset. They considered that that statement did not give an accurate picture of the mechanism.

In a printing ink containing wax, the wax particles or agglomerates were as a rule very much larger than the pigment particles. A proportion of the vehicle was absorbed by the paper, leaving a pigment-wax concentrate close to its surface. The larger wax particles tended to be left behind, thus remaining more distant from the paper surface. It was not suggested that the wax formed a continuous film over the whole of the print, at least not in general practice, but rather that the wax particles formed a series of raised points on which the next sheet rested.

Waxes played an important part in the formulation of metallic inks. Generally, they improved the leafing of the metallic particles and their adhesion to the paper, and also retarded the evaporation of the volatile solvents; the solvents would probably evaporate too fast during printing if the evaporation were not retarded by the wax. The mechanism by which the wax influenced the leafing was less clear. It was possible that the wax particles formed interspersed layers between the metallic leaves, thus enabling them to align themselves parallel to the paper surface in the print.

As a Precipitant

After describing a recently developed method for the rapid drying of print, known as "precipitation drying," the authors said that molten wax might be used as the precipitant when the prints were to be waxed (W. W. Mock, U.S.P. 2,081,949). Immediately after printing, the prints were run through a bath of molten wax, such as paraffin wax, at 100°-150°C. The solvent dissolved in the wax and, as the cellulose ester was not compatible with the molten wax, it was precipitated on to the paper.

Fats and Greases

Reviewing the use of fats and greases in inks, the authors stated that on the whole both would reduce the length and tack of inks without reducing the viscosity to the same extent as would low viscosity thinners such as kerosene. Both tended to reduce excessive drying and helped to prevent crystallisation. As a rule, relatively small amounts of either greases or fats were added to an ink. An excess might reduce the tack to such an extent that the ink would not distribute properly on the printing press; the drying properties of the ink might be seriously impaired, and the medium might even strike through the paper so as to cause a greasy stain on the reverse side of the print, or the medium might spread to form an oily halo round the print.

Discussing carbon paper inks, the authors said that in the past carnauba wax was probably the most extensively used was for the manufacture of carbon paper inks, particularly where a fairly hard film was required. It had now found serious rivals in certain I.G. waxes and other synthetic waxes. Some cheaper waxes, such as crude and refined montan wax, also found some application. Various other waxes were also used to modify properties of ink films.

American Chemical Notebook

From Our New York Correspondent

U.S. production of ammonium nitrate, chlorine, hydrochloric acid and caustic soda for January, 1948, was the highest on record, the three first-mentioned chemicals exceeding previous records achieved in December, 1947. Output of synthetic ammonium sulphate, soda ash, and sulphuric acid declined slightly from the December (1947) figures. January production totals (in short tons—synthetic ammonium sulphate in lb.) for these seven chemicals were: Ammonium nitrate 95,357; chlorine 123,319; hydrochloric acid 39,232; caustic soda 228,946; ammonium sulphate (synth.) 25,252; soda ash 732,009; sulphuric acid 935,230. Of the other 28 chemicals included in the Bureau's continuous monthly survey of 35 chemicals, nine were produced in larger quantity in January than in the previous month, and the production of 18 chemicals was larger than a year ago in January, 1947. Most of the decreases were small and occurred in many cases for chemicals having relatively small monthly volume.

* * *

The $10 million conversion of a Government war surplus magnesium chloride plant at Lake Charles, Louisiana, to caustic and chlorine production, the Southern Alkali Corporation and H. K. Ferguson Co. have jointly announced, has been almost completed. The plant, which has been in course of conversion for 21 months, will produce more than 200 tons of liquid chlorine, and 225 tons of high-grade caustic soda per day, thus substantially increasing U.S. production facilities in this field. In converting the plant, some of the existing equipment previously used in the processing of magnesium chloride has been retained.

* * *

Production of a new type technical grade DDT, which will be marketed under the trade name Pentech, has been announced by the Pennsylvania Salt Manufacturing Company, Philadelphia. Because the new material can be made directly into finished dusts without the necessity of using 50 per cent concentrates, substantial economies can be effected by manufacturers of agricultural and household dusts in freight, storage, handling and production. Pentech, which will be handled through the company's agricultural chemicals division, can be mixed with powdered dilutents in equipment installed in many insecticide mixing plants for the production of finished DDT insecticides. Other Pennsalt dust compounders previously introduced by the company include Penco BHC Technical-36, the high gamma isomer BHC, the Penco BHC D-12, a 12 per cent gamma isomer dust base.

* * *

In the annual report of the United States Steel Corporation released last week Mr. Irving S. Olds, chairman, indicated that the company set a new high in production in 1947 with the output of 28.6 million net tons of steel. Dollar receipts from customers were the highest in the history of the corporation, amounting to $2122.786 million (an increase of $627 million over 1946), while income, after deducting taxes, totalled $127.098 million (an increase of $38 million over 1946). Production in 1947 averaged 96.7 per cent of rated capacity and would have approached full capacity had not operations been affected by "conditions outside of United States Steel's control," the report said. This compares with production of 72.9 per cent of rated capacity in 1946, when serious steel and coal strikes caused an estimated production loss of 6.3 million net tons. Expenditure in 1947 for enlargement and improvement of steel-making facilities totalled approximately $206 million, the report states. "Since V-J Day, United States Steel's programme for additions to and replacements of facilities has reached a total of about $775 million."

* * *

At a meeting of the Akron (Ohio) Section of the American Institute of Chemical Engineers last week Mr. C. A. Stokes, director of research and development, Godfrey L. Cabot, Inc., Boston, said that rising construction costs and rising costs of natural gas may hold back the construction of additional capacity for the production of chemical type carbon black. The use of petroleum oils in conjunction with natural gas in a furnace-type process, however, offered the best promise of giving the United States a continuing supply of high reinforcing furnace black at price levels near those prevailing for channel black. If petroleum oils became too scarce or too highly priced, carbon black could be made from coal products instead. Economic problems, however, said Mr. Stokes, were of first importance to the carbon black industry. Quality had already been achieved. Some grades of furnace black imparted longer wearing qualities to tyres than black made by the channel process. Another important advantage of furnace black was its adaptability to synthetic rubber.

Metallurgical Section

Published the first Saturday in the month

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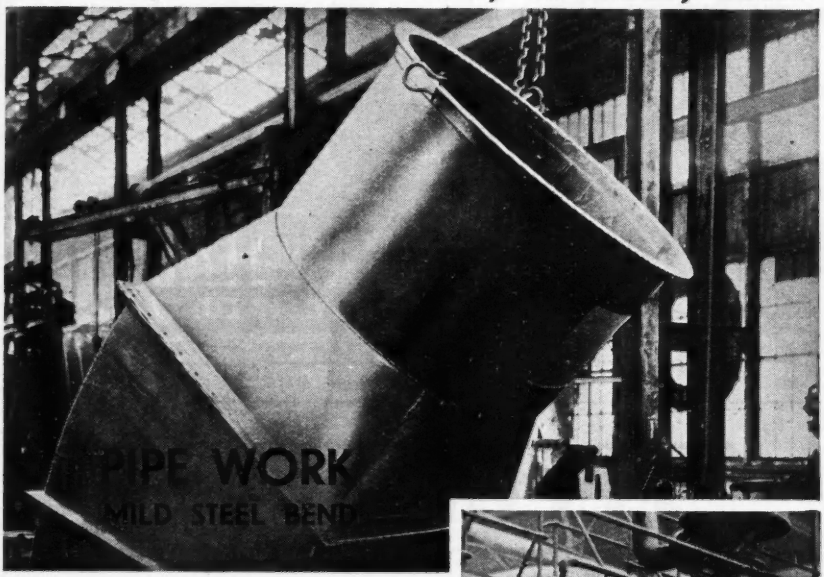

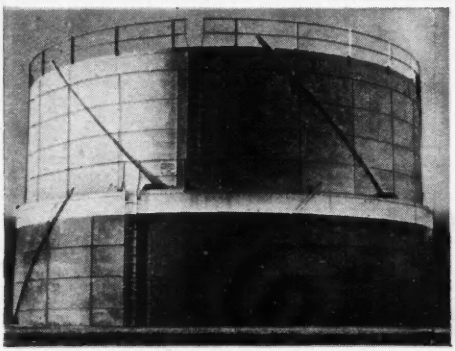

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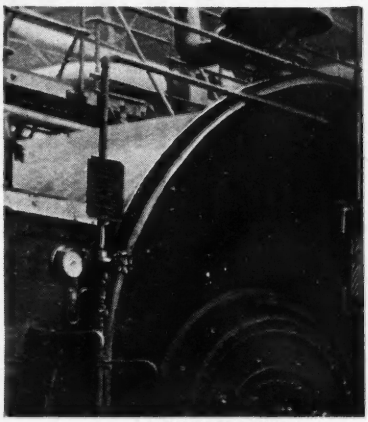

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Metallurgical Section

3 April 1948

METAL CLEANING PROCESSES—III

Varying Treatments for Special Needs

by L. SANDERSON

WHILE it is possible to clean in the same way material which, to prevent corrosion, has been coated with thick oil or paint or has been hardened in an oil bath, there are occasions when the method fails. It is necessary then to clean in two stages. The first is carried out with an emulsifiable cleaner either in a still tank or by spraying. Alternatively, a degreasing solvent may be employed where the work is suitable. The second stage employs an alkaline solution in the same way as for parts that have been quenched in oil.

When work is needed with a specially clean surface for electroplating, and has previously been buffed and polished, cleaning must also be carried out in two stages. First, all surface dirt must be eliminated, and as it may consist of one or more of a dozen different abrasive or other materials, the cleaning represents no single problem. Often it is essential to employ special cleaners and compounds. There is, however, a wide range of cleaning problems that can be solved by means of normal materials and methods.

The first requirement, quite apart from the character of the buffed or polished metal, is a precleaning operation carried out with a high-grade emulsifiable cleaner. This should give the work a surface good enough to take paint, lacquer, or other types of finish exclusive of electroplating.

Electroplating

Cleaning for electroplating or for vitreous enamelling calls for a surface free from all microscopic surface cracks, and from oily or greasy patches and all minute irregularities must also be removed. There has been considerable advocacy of electrolytic cleaning for this class of work, but although the method has the advantage of being a single operation, the results are not always fully satisfactory.

The two-stage process advocated here eliminates the rough dirt by pre-cleaning, and then employs electrolytic cleaning on a relatively dirt-free surface. It is then a simple matter to select the proper finishing solution to deal only with the small amounts of dirt left behind in pores or crevices, and with the residues of oils and greases on the surface that might prevent wetting.

High-grade alkaline solutions are required for finish cleaning of steels, if immersion or mechanical washing is employed; they act quickly, completely wet the surface, and penetrate more readily into the pores of the metallic surface than cheaper or inferior alkaline cleaners. Moreover, they give the steel a brighter finish. They can also be employed in electrolytic tanks for this kind of process and, when required, may be employed for work that need not be precleaned for plating or enamelling.

Blended Cleaners

Non-ferrous alloys and other metals of non-ferrous type need specially blended cleaners, the composition of which is governed by the metal concerned. A soft die-casting requires, for example, a different cleaner from that required by the brasses. Different cleaners will also be needed for work made up of a combination of metals. Immersion, mechanical washing and electrolytic processes of cleaning likewise each demand their different cleaners.

Anodic cleaning is usually used for the concluding stage, and the solution must therefore be able to carry sufficient current to give the high densities necessary, and must be free from any constituent capable of setting up anodic corrosion. Highly efficient penetration, wetting and dispersal are other requirements. Cleaners of this type have the power of reducing the surface tension, so that the work is more readily drained and drag-out wastes are minimised. This enables the rinsing operation to be more quickly performed, and its higher efficiency means that the electrolytes, etc., eventually employed are not so likely to suffer contamination from the residues of the cleaner, or to be hindered by surface films.

Instantaneous operation is required of the electro-cleaning agents. Die-castings, steel and brass call for concentrations of 4, 12

and 6 oz. per gal. respectively. Steel must be cleaned at 100° C., brass at 70 to 80° C. and die-castings at 80 to 90° C. The current density should be about 50 amp. per sq. ft. It is advisable to use cathodes of perforated nickel-plated steel.

There has been a noteworthy improvement in chlorinated solvents for metal cleaning. The mode of operation is as follows. The work is suspended, while still cold, in a vapour thrown off by the boiling solvent, which condenses on its surfaces, producing a liquid that dissolves aggregated oil and grease. The materials removed trickle down with the liquid, and drop back into the boiling degreaser.

A number of oils and greases are, however, insoluble in a particular liquid. Moreover, the condensate flows over the work too slowly to eliminate every particle of lime, paint, metallic matter or solid dirt generally, some of which may also not be susceptible. It is therefore frequently essential to carry out extra cleaning operations, which may be either hand rubbing, additional solutions, or single- or double-stage degreasing.

For electroplating or vitreous enamelling after degreasing, this process will be inadequate because the surface will not be left chemically clean. A single degreasing operation, moreover, is often insufficient to produce even a physically clean surface, and hand or mechanical operations may be required to complete the work.

Two-stage Degreasing

Because of these drawbacks, the modern tendency is to use double-stage degreasing. The first stage comprises immersion or spraying of the work with the solvent, or immersion in a tank of solvent in which mechanical agitation is employed. This removes a certain amount of the solid dirt, but it is seldom that a single dip, even with agitation, proves adequate. The problem is met by a modern degreasing machine in which the work is first steeped in the solvent, steeped again in a different bath, and finally sprayed with the solvent. The work is then cooled by immersion and soaking in a tank of the cold solvent, or by introduction into a refrigerated zone. The concluding process is ordinary vapour degreasing, with rinsing and drying.

Spraying of the solvent is a necessity in this improved method, but such spraying is difficult and high pressure is essential or the less accessible areas will not be cleaned. The work will not have a chemically clean surface, and where that is needed a cleaning in alkaline solution must complete the process.

The degreasing solvent is particularly useful when it is desired to eliminate oil and grease from small metal objects possessing rolled edges, pockets, seams, etc., which would prove hard to drain off water solutions or to rinse and dry. It is also advantageous when it is necessary to remove soluble lubricants or rust-preventives. Particularly is it suitable for cleaning non-ferrous alloys and metals that might be stained by water solutions and rinses.

Danger of Rust

It must not be overlooked that ferrous metals quickly rust after the degreasing operation, and have therefore to be protected by rustproof pigment, paint or lacquer as soon as the work is done. When aluminium and its alloys have been ground or polished, a small sprinkling of minute particles of aluminium is usually left behind. The catalytic action of these particles disintegrates the trichlorethylene solvent, leading to the creation of hydrochloric acid and the initiation of corrosive attack in both the work and the bath.

Trichlorethylene solvent degreasing costs more than either alkaline or emulsifiable cleaning processes, partly because the solvent is itself expensive and partly because the water for the condensing coils must be cooled, constituting an addition to the expense that must be taken into account. On the other hand, the heating of an alkaline solution costs more than that of a solvent, so that in this connection emulsifiable cleaners are the most economical.

To reduce wastage of solvent to a minimum, the type of cleaning machine chosen should be well designed and closed; even then there will be wastage. It is stated that some solvents cost from double to quadruple the cost of an emulsifiable cleaner per square foot of surface dealt with, so that from this point of view the alkaline solution is the most economical.

Perchlorethylene

All three cleaning processes need water, and usually a greater quantity is needed for vapour degreasing than for the alternative processes, despite the fact that it is required solely for condensation. It must also be noted that however well designed and constructed the degreasing plant, its service life rarely exceeds a few years, whereas the machines employed in the alternative processes frequently last for as much as 10 or 20 years.

To overcome the difficulties enumerated above, many works are making wide use of perchlorethylene as a solvent degreaser and have secured improved results. When this material is used, no water is required for condensation because the boiling point is considerably higher; cooling systems need

HARD METALS TECHNOLOGY

Progress with Magnesium Reported in New York

DEVELOPMENT of a practical process for electro-plating magnesium articles to provide a hard, scratch-resistant surface, and disclosures of new magnesium alloys, some of which provide compressive strengths of 74,000 lb. p.s.i. were described at the annual meeting in New York last week of the Magnesium Association. In an interview at the meeting, Dr. T. H. McConica, assistant general manager of Dow Chemical Company's magnesium division, urged that in view of the trend of world affairs Government stockpiling of magnesium is an urgent necessity.

Discussing the new electro-plating process, W. S. Loose, of the Dow magnesium laboratories, said that it opened up a large new market for magnesium, particularly where die-cast items are concerned. Items manufactured by the new method would, he said, offer competition to automotive and builders' hardware items now cast from zinc. The process, he said, consisted of applying to magnesium articles a thin coating of zinc, after which the articles are electro-plated by conventional methods. The Dow Company is planning to licence other companies to use the process, and is currently negotiating with six manufacturers and electroplaters interested in the process.

In the principal address, Lieut.-Gen. R. A. Wheeler, chief of engineers, Department of the Army, said that five important problems of development of air-borne military equipment had been solved in experiments with new magnesium alloys, some of which provided compressive strengths of 74,000 lb. p.s.i. The technical research programme was being continued "on a higher peacetime level and larger scale than at any time in our history."

Among the studies mentioned by General Wheeler were those concerned with earth-moving and heavy construction equipment, bridging, portable maintenance shops, trailer transports and other engineering equipment. Some of the improvements he mentioned as having been achieved by the use of magnesium were a saving of one ton in a new five-cubic-yard truck body which now weighs only 1700 lb.; portable roadway materials and magnesium pipeline equipment.

Stockpiling Urged

Recalling that current magnesium production in the United States is only 22 million lb. annually and that potential production could be boosted within 18 months to 250 million lb. per year by reviving stand-by plants, Dr. McConica said that in view of world conditions and the fact that it would take some two-and-a-half years of major construction to bring U.S. output to the 500 million lb. peak war output, it would be wise for the U.S.A. to initiate stockpiling of magnesium. A sharp increase in the use of magnesium for both industrial and military purposes was anticipated and he considered that stockpiling of several 100 million lb. of ingot a year against possibility of a war would be prudent.

METAL CLEANING PROCESSES

(Continued from previous page)

not be introduced and the machine can be portable.

Solvents of this type condense at a much higher temperature than 100° C., and therefore there is no catalysis for the reason that water cannot remain in such a system.

The vapour of perchlorethylene weighs more than that of trichlorethylene—approximately in the ratio of 3 to 2, so that a smaller wastage of solvent as vapour is caused. The fact that the solvent is heavier renders it more adaptable to spraying, and spraying systems are easily arranged for pre-cleaning in a machine. In fact, the greater weight of the solvent, whether as a liquid or a vapour, makes spraying in uncovered tanks feasible in a number of cleaning processes.

In addition, there is a type of inhibited perchlorethylene, usually termed tetrachlorethylene.

Petroleum distillates are used when it is not required to develop a chemically or even a physically clean surface in advance of further operations such as electroplating, enamelling, etc. Nevertheless, these distillates do eliminate dust, swarf, shop dirt and other fairly readily handled materials from metallic surfaces before they are assembled. This type of cleaning will also remove thin coatings of grease, oil or preventives. It does not set up corrosive attack, staining or rusting of the work, and is adaptable to numerous cleaning operations.

Petroleum distillate cleaners are extremely volatile and their flash points are low, so that maximum care must be exercised in their use. It is important never to use them in open tanks, while the machines employed must be designed specially for the work and built accordingly, with the right type of protective apparatus and equipment for the rapid extinguishing of fires.

(To be continued)

C

Development of Powder Alloys

Widening Use for Fabricating Hard Metals

ONE of the most important of the rapidly increasing applications of powder metallurgy is in the production of hard metal compositions which have been the subject of much research and many patents in recent years. In the U.S.A. the American Electro Metals Corporation is one of the leaders in this study, and in their English patent application No. 13283/1947 (Conv. date, U.S. May 22, 1946) they claim a new kind of tool material produced from hard particles of powder of chromium boride and a binder of nickel-chromium-boron alloy, together with some iron, silicon, and carbon, having a melting point of 1025-1250°C. The chromium boride is produced in the known manner, *e.g.*, from an initial mixture of chromium, boron, and aluminium in suitable proportions.

Powder Mixtures

Mixtures of borides are apparently formed (CrB, Crb_2, Cr_2B_2), but CrB_2 is always present and may form between 1 and 98 per cent. The borides are comminuted to the right particle size in any known manner, wet or dry, in air or protective atmosphere. They are then mixed with the binder alloy of nickel base containing minor amounts of chromium and boron, and, if desired, of other additions, such as iron. A powder mixture of equal weights of borides and binder alloy is well suited to the purpose of this invention.

Mixing is followed by pressing to the shape desired of tool tip or die blank, under, say, 45 tons/sq. in. and sintering in a non-oxidising or protective atmosphere, such as very dry hydrogen or cracked ammonia, at a temperature of 1100-1150°C. for 30-60 minutes. If the chromium borides amount to 75 per cent and the binder 25 per cent, a much higher temperature is required—1800-1850°C. In some cases metallic nickel or cobalt may be used as binder. Prolonged experiment has shown that it is essential to have a pre-formed binder.

A suitable lubricant may also be incorporated, up to about 2 per cent; and it is preferable to pre-sinter at about 200-500°C. in order to volatilise the lubricant before the main sintering. In view of the relatively high sintering temperatures required for shapes compressed from initial powder containing much more than 50 per cent chromium borides, hot pressing of this initial powder is recommended.

For this, mixtures of powdered chromium borides and lowest melting binder alloy (possible 65-75 per cent nickel, 13.20 per cent chromium, 2.5 per cent boron) with some iron, silicon, and carbon totalling not more than 10 per cent, are subjected to sintering under pressure, *i.e.*, hot pressing in carbon crucibles or moulds, or a graphite ring with two plungers. Induction heating has given very good results.

Extraordinary hardness and corrosion resistance are claimed for tool tips or dies thus made, the Rockwell A hardness ranging from 80 to 83 according to temperature. Transverse rupture strength is somewhat less than that of sintered carbides, but may be considerably improved by reducing the fineness of the original powders, especially of the borides and/or by certain additions. In any case lower rupture strength is of small importance in the uses to which the material is put. Hard metal carbides may be incorporated to a certain extent with the chromium borides, such as those of tungsten, titanium, etc.

Welding Research

Report on Design and Electrical Measurement

A REPORT dealing with the measurement of secondary current, voltage and electrode load cycles for spot welding machines has been prepared by Dr. G. E. Bennett, of the Royal Aeronautical Establishment, an expert in electronic measurement, and Mr. H. E. Dixon, one of Britain's leading experts on light alloy welding.

The paper contains a description of the measuring equipment and the method of using it, and, in connection with current measurements, gives details of toroid design, of the limits of accuracy and the method of calibration.

In the case of tip load measurement, a full description is given of the pick-up units and the different circuits and equipment that can be used to convert the tip force into an oscillograph deflexion directly proportional to the load and free of spurious results and interference that can arise from the welder current and other causes. The report also describes a three-element cathode-ray oscilloscope for simultaneous recording, employing a drum type camera with a paper speed of 7.5 in. per sec. Alternative equipment that could be used is mentioned.

The paper is to be published in the April issue of the Welding Research Supplement to the Transactions of the Institute of Welding.

GERMAN POWDER METALLURGY

Wartime Advances in Technique

IN developing powder metallurgy techniques the Germans relied almost entirely on the "hot-press" method, especially in the manufacture of sintered carbide hard metals. This is evidenced by the report* on cost-reducing powder metallurgy techniques describing German wartime advances in this field prepared by Dr. Gregory Comstock, director of the powder metallurgy laboratory of the Stevens Institute of Technology, Hoboken, New Jersey.

The full report includes information on the preparation of metal powders, the manufacture of powder metal parts and hard sintered carbides by the hot-press method, and describes composition and uses of carbides for projectile cores and cutting tools.

Advantages of Hot-Pressing

In powder metallurgy processes metal powders are pressure-moulded into desired shapes and sizes, and the usual forging or casting and machining operations are eliminated. Wartime experience in the U.S.A. and in Germany has shown that if sufficiently developed, parts made by powder metallurgy techniques can be economically substituted for forgings, castings and machined parts.

The outstanding war development in the German hard cemented carbide industry appears to have been the standardisation of compositions and methods of manufacture. A number of new steps in fabrication processes are also described. The hot press, used in the production of cores for armour-piercing projectiles and in the development of tungsten-free cutting materials, is believed to be the most outstanding innovation.

"The advantage of employing the hot press as a means of quickly and inexpensively producing very large objects of hard cemented carbide or a limited number of pieces of intricate cross-section has been recognised in the United States for a long time," Dr. Comstock writes. The Germans surmounted the difficulties usually associated with the simultaneous application of great heat and pressure (that of loss of the molten binder by extrusion) by using carefully weighted pre-pressed charges with a constant apparent density to control the final volume. The methods are described.

The German hot press is of the graphite resistance type, the spring clamped mould being the resister with a separate mechanical or hydraulic system available for applying the top and bottom plunger pressure. A corps of electrical, mechanical and metallurgical engineers successfully designed an ingenious series of auxiliary machines for the mass production of mould, plunger, and separator forms. The result is a system of hot pressing rather than an improvement of the hot press as a unit device.

Dr. Comstock reports that a rotating disc method was universally used for disintegrating all kinds of molten metals, alloys or even emulsions of non-alloying metals. The process, developed by the Deutsche Pulvermetallurgische Gesellschaft and licensed for use by eight other metal plants, is described and illustrated.

Regulated Particles

The disintegration method is simple: The molten metal, superheated in the case of metals of high melting point, flows through a funnel crucible having a nozzle 7 to 9 mm. in diameter and strikes a disc rotating at high speed, on which knives are mounted. The molten stream is enclosed by a water cone which is formed by a ring nozzle below the outlet of the funnel crucible.

The size and shape of the particles is changed by varying the rotation speed from 2000 to 6000 r.p.m. and regulating the water nozzle. The powder, washed into a container by the water employed in the operation forms a slime which is dried. The resulting powder has a particle size of about 0.6 mm. Copper, silver and aluminium powders as well as a number of different powders for research were produced by the rotating disc method.

Production of metal powders by pressure atomisation with steam is also described. The shape of the iron powder particles produced by this method was more nearly spherical than those produced in the rotating disc method, but the "pressability" of the particle was found to be less satisfactory.

* German Powder Metallurgy, No. PB 30354r, the Office of Technical Services, United States Department of Commerce, Washington 25, D.C., $3.25 per copy, containing numerous flowsheets illustrating preparation of metal powders, tables giving analyses of many types of carbides, and several microphotographs show the structure of types of sintered hard metal, including that of tungsten carbide, titanium carbide and cobalt alloys.

More Metallurgical Fuels. — Supplemental allocations of metallurgical fuels for extra steel production are included in over 18.5 million tons of coal and coke to be delivered to European countries during the second quarter of this year on the basis of allocations agreed upon by the representatives of 17 countries, participating in the U.N. Economic Commission for Europe. It is expected that 3-400,000 additional tons of steel will thus be made.

New Stainless Steel Process

Changed Furnace Technique Reported from South Africa

SOME important innovations in connection with the manufacture of stainless steel and low carbon ferro-alloys are reported in a recent issue of *The South African Mining and Engineering Journal*.

The new process, which has been developed and patented by the African Metals Corporation, is characterised by the fact that the ore, a reducing agent and a slag-making agent are pre-heated, then introduced into the furnace and worked into a thick viscous basic slag which has a high content of oxides of the alloying metal or metals, and is adapted to retain the reducing agent in suspension. The slag is then again heated and a further quantity of the reducing agent added. This has the effect of working the slag down to a more fluid condition and reducing the oxides to the alloying metal or metals.

Regulated Content

The reducing agent may comprise one or more of the non-carbonaceous reducing agents such as ferro-silicon, silicon metal, calcium silicide, ferro-chrome-silicon, ferro-manganese-silicon or aluminium. These are used in amounts slightly in excess of the theoretical equivalent necessary to allow for volatilisation losses in the furnace. The amounts of ore and slagging material are calculated to provide the necessary alloy addition to the bath for a reasonable recovery of metal from the ore, and to yield a workable slag high content of basic compounds.

In the preliminary stages the ore, reducing agent and slagging material are preheated to drive off substantially all the free or combined moisture. Charging is preferably effected in successive batches of oxides and reducers alternately.

The bath of low-carbon iron or steel may be prepared from substantially rust-free scrap iron or scrap alloys which may or may not contain the alloying metal or metals to be introduced by these processes. Scrap iron or scrap alloys may be added to the furnace with the initial charge, and superheating of the viscous slag carried out to any suitable degree of temperature. In the case of low-grade chromitite ores, the preferred slag superheat is between 1525° and 1725°C.

When the thick slag, high in oxides and well super-heated, has been built up on the bath, a mixture of the remainder of the hot reducing agent with sufficient lime or other slagging material to maintain the basic nature of the slag is spread over the slag. Generally the ratio of the total bases to total acids is in excess of 1.25 to 1, and may be as high as 2 to 1.

In practice it has been shown that while the essential chemical reaction of chromium oxide reduction is proceeding, the graphite electrodes should be raised clear of the slag bath in the case in which a direct arc furnace is used. This allows the reaction to proceed steadily, and avoids precipitation of carbon and silicon in the metal phase.

The slag obtained when operating this process generally contains a beneficiated ratio of 10 to 1, and thus constitutes a useful source for the production of ferro-alloys of a high alloy content. It may conveniently be used in the production of the reducing agent to yield a product such as ferro-chrome-silicon when stainless steel and iron is being made, since, in addition to the required amount of reducing agent, it also contains an appreciable amount of the alloying metal instead of iron. This materially decreases the ore requirements and thus the slag volume in the steel production process.

It is stated that this invention permits the direct production of low-carbon alloys of iron with chromium, manganese and similar metals.

Light Metals Statistics

Ministry of Supply statistics relating to U.K. production, consumption, imports and uses of light metals in January, 1948, have been issued as follows (in long tons):—

Virgin aluminium: Production 2574, imports 7513. Secondary aluminium: Production 8540. Aluminium scrap arisings: 11,499; consumption 7341. Aluminium fabrication: 21,687. Magnesium fabrication: 272.

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PERSONAL

MR. WILLIAM EDGE, of Davenham, assistant works chemist, left £2098, net £1580.

MR. R. F. KEMBALL, the great-grandson of one of the founders of Kemball, Bishop & Co., Ltd., has been elected a director of that company.

The 107th annual general meeting of the Chemical Society elected the following officers: President, SIR IAN HEILBRON; treasurer, SIR WALLACE AKERS; hon. secretary, DR. ALEXANDER KING. DR. J. L. SIMONSEN and PROF. D. H. HEY continue to hold office as hon. secretaries.

DR. E. M. LOURIE, director of the department of chemotherapy in the Liverpool School of Tropical Medicine, has been awarded the Chalmers Medal for 1945. The medal is presented every second year to mark research of outstanding merit contributing to knowledge of tropical medicine or tropical hygiene.

DR. C. E. H. BAWN, Reader in Physical Chemistry at Bristol University, has been appointed to the Grant-Bunner Chair of Inorganic and Physical Chemistry at Liverpool, and will succeed PROF. W. C. MC LEWIS, who is retiring. A graduate of Bristol University, Dr. Bawn was appointed Lecturer in Chemistry at Bristol in 1938 and during the war was engaged in armament research for the Ministry of Supply.

LORD PORTAL, appointed Controller of Production, Atomic Energy, in the Ministry of Supply in March, 1946, has asked to be relieved of his duties as from the end of March, in accordance with the understanding reached when he took up the appointment. The Government has asked him to continue to control and supervise policy of the production organisation for a further year after he relinquishes his full-time paid appointment. Lord Portal has agreed, and will continue to act on a part-time basis, without salary, for another year.

DR. GEORGE OENSLAGER, of Akron, Ohio, whose pioneer research in the chemistry of rubber has been of decisive importance, has been awarded the first Charles Goodyear Medal of the Division of Rubber Chemistry of the American Chemical Society. The Goodyear award, established this year to honour rubber chemists for outstanding achievements, is in recognition of Dr. Oenslager's discoveries that greatly reduced the price and increased the life of tyres and many other vulcanised rubber products. He developed the first organic accelerators, and was largely responsible for the production of carbon black as a rubber-reinforcing agent which made tyre treads many times more resistant to road wear than was possible hitherto.

The Bessemer Gold Medal for 1948 has been awarded by the Council of the Iron and Steel Institute to MR. J W. DAWSON (formerly of Hadfields, Ltd.) for his contributions to the development of steel castings and to the production of alloy and heat-resisting steels. The Sir Robert Hadfield Medal goes this year to MR. A. PREECE (Leeds University) for research on the scaling, overheating, and burning of steel. The Williams Prize has been awarded to MR. R. FOWLER (Richard Thomas and Baldwins, Ltd.) for a paper on "Blowing Out a Blast-furnace."

Obituary

The death has occurred at Uddingston, Glasgow, of MR. WILLIAM DOWNS, J.P., 86, who was at one time chairman of the Scottish Iron and Steel Co., Ltd., now a constituent part of Bairds and Scottish Steel Co., Ltd., of which his son is a director.

ARMOUR RESEARCH STUDIES

THE Armour Research Foundation, of Illinois Institute of Technology, reporting on the 214 active industrial research projects in progress during the last fiscal year, reveals that a new project has been undertaken to find a suitable substitute for palm oil in hot dip tinning, and one to explore more fully the rôle of molybdenum in overcoming temper brittleness in heat-treated steels. A project on tin plate included studies on electrotinning and flowing of electrodeposited tin, on the development of an electroplate thickness tester, and of the fundamentals of corrosion of the steel base with respect to physical metallurgy and electrochemical factors.

American Scientists Honoured

Prominent U.S. scientists were recently awarded Frank B. Jewett fellowships for 1948-9 by the American Telephone and Telegraph Company for research in the physical sciences. The list included Dr. Warren J. Brehm, at present investigating the possible synthesis of lysergic acid at Harvard University; Dr. Ernest M. Grunwald, for the study of the activity of non-electrolytes in certain solvents; Robert Karplus, for work on nuclear research at the Institute for Advanced Sudies, Princeton; and Alvin I. Kosak, research fellow in the chemistry department, Ohio State University, for research in organic chemistry at Harvard University.

PARLIAMENTARY TOPICS

Copper Prices.—It is not intended to announce the contract prices to be paid by the Ministry for copper.—Mr. G. R. Strauss.

Chrome Ore Price.—There has been no increase in the price of chrome ore since March 1, 1948.—Mr. G. R. Strauss.

China Clay Exports.—The quantity of china clay exported in 1938 was 367,000 tons and in 1947, 249,000 tons. The corresponding values were £696,000 and £1,028,000.—Mr. A. G. Bottomley.

National Research Corporation.—Asked when he intended to introduce his Bill for setting up a National Research and Development Corporation, Mr. Harold Wilson said he hoped to be able to do so in the near future.

Imported Stearine.—Asked what increase had taken place in the price of stearine since March 1, Dr. E. Summerskill said there had been no price change since September, 1947. The price of stearic acid, however, had been increased by £20 17s. 6d. per ton from February 1 as a result of increased cost of raw materials.

Soda Ash Production.—Soda ash production capacity as it existed before the war was quite inadequate to deal with the full industrial needs of the country in conditions of full employment. The expansion of the industry which would have taken place during the war years had to be deferred, but I am doing my best to expedite the completion of new capacity.—Mr. Harold Wilson.

New Factories Bill.—The text of the Factories Bill introduced in the Lords last week provides that the medical examination of young persons under 16 entering factory employment shall be extended to cover all young persons and the system will also operate in certain other classes of employment. The Bill contains special clauses for medical supervision of employees if risks to health are suspected as a result of changes in a process or the use of new substances.

Scientific Manpower.—In reply to a question asking for a comparison of the scientific manpower output at the present time with the estimates and targets set by the Barlow Committee, Mr. D. P. Jay said that the Barlow Committee recommended the doubling of the prewar output of graduates in science and technology as soon as possible. On the best estimate available this increase would be realised within the next two years and was likely to be maintained thereafter.

Monopoly Bill.—A Bill (Monopoly Inquiry and Control) " to make provision for inquiry into the existence and effects of, and for dealing with mischiefs resulting from . . . the supply of, or the application of any process to, goods, buildings or structures, or as respects exports," was read for the first time last week. It was presented by Mr. J. H. Wilson and supported by Mr. Herbert Morrison, Sir Stafford Cripps, Mr. A. Woodburn, Mr. G. R. Strauss, Mr. C. W. Key and Mr. J. W. Belcher. It will be read a second time on Tuesday, April 6, when it will be printed.

C Licences Evasion

THE Traders' Road Transport Association, the national organisation of individual " C " licence-holders, states that it is perturbed by the assertions frequently made that goods vehicle operators, including those holding "C" licences, are failing to comply to the full with the conditions attaching to their licences, and that "C" licensed vehicles are being used illegally to carry goods for hire or reward. The association says that no specific evidence can be found that such infringements are taking place. The association accordingly invites anyone who can produce such evidence to send it to the Secretary of the association at 146 New Bond Street, London, W.1, so that the matter may be fully investigated and appropriate action taken.

Official Notices

Acetic Acid Supplies.—The Ministry of Food has again made arrangements for the release of acetic acid to bakers for the control of " rope " during the coming summer. For bakers with weekly sackage of 100 and over, 80 per cent acetic acid will be released against a permit issued by the Directorate of Molasses and Industrial Alcohol, Downs Road, Epsom, Surrey. Bakers with a weekly sackage below 100 will be able to obtain without permit dilute acetic acid (12 per cent strength) through the yeast distributors.

Sperm Oil Prices Down.—The Ministry of Food announces that the only change in the prices of unrefined oils and fats and technical animal fats allocated to primary wholesalers and large trade users during the five week period ending May 1, 1948, is a reduction of £23 per ton in the price of sperm oil. The new ex-store prices for sperm oil are: Crude heads £102 per ton naked, blubber £102 per ton naked, carcase £100 per ton naked, No. 3 £99 per ton naked.

Home News Items

Record Safety Glass Exports.—Exports of safety-glass reached a record figure in 1947, being 30 times the 1937-38 figures, according to a statement by Triplex Safety Glass.

Export of Anthracite.—About 150,000 tons of Welsh anthracite are expected to be shipped to Canada from Swansea this year, compared with 50,000 tons during 1947.

Laboratory Roof Fall.—Three workmen engaged on the construction of a four-storey building at an I.C.I. laboratory at Blackley, Manchester, had a narrow escape when 20 tons of concrete crashed down from the roof last week.

Aeronautical Bus Building.—Aircraft production methods in the construction of bus bodies have enabled Scottish Aviation, Ltd., Prestwick Airport, to manufacture a 32-seater motor-coach of aluminium and other light alloys half a ton lighter than those made by accustomed methods.

N.-W. Coal Production.—In spite of the Grand National and other big sporting events, 24 pits were working in the North-West on March 20—the highest number this year. During the first five days of the week the miners put up the second-best performance of the year, raising 299,451 tons, the highest total for 10 weeks.

Britain Loses £500,000 Order.—Swiss competition, based on lower wages, longer hours, cheaper and better quality iron ore and cheaper coal, was responsible for the Newcastle firm of C. A. Parsons & Co., Ltd., turbo generating plant manufacturers, losing an order worth £500,000, declared Sir Claude Gibb, the firm's managing director, last week.

B.O.T. Decision Criticised.—Darlington Development Committee has decided to protest to the Board of Trade against a proposal to establish a factory outside the town, on the Aycliffe Trading Estate, for the local firm of Daralum Castings, Ltd. Owing to existing limitations on capital expenditure the board now wishes to cancel purchase of an original Darlington site and has offered Aycliffe as an alternative.

Shale Oil Wages Dispute.—The application by Scottish shale workers, through the National Union of Shale Miners and Oil Workers for a 10 per cent wage increase—with a variety of other concessions—has been turned down by Scottish Oils, Ltd., the employing company. An offer of a 5 per cent increase has been refused by the miners, who are now sending the matter to arbitration.

Pig-iron and Steel Stocks.—Arrangements have been made for the inclusion in the Statistical Digest of stocks of pig-iron and steel scrap.

£1000 Fire Damage.—Damage to the value of about £1000 was caused by a fire last week at the premises of Shearer Brothers, metal refiners and smelters, David Street, Glasgow.

Protest Against "Purge."—In a statement issued last week, the executive committee of the Association of Scientific Workers recorded its "emphatic protest against the Government's recently announced purge of the Civil Service."

Processing of Peat.—A diesel-driven peat processing machine, operated by six men, is now being assembled at Camster, Caithness, under a Department of Agriculture scheme. Fed in conveyor buckets, the wet peat is macerated, compressed into blocks and then dried in the sun.

Manx Minerals.—On the taking over of the Crown's mineral rights in the Isle of Man, the Manx Government is to consider steps for encouraging the development of mineral deposits. Previously mining in the Isle of Man has been confined to the lead mines in Ladey and Foxdale, now derelict.

Long Service.—At a reunion of 190 long-service employees of the Dalzell Steel Works at Motherwell Town Hall last week, Sir John Craig, chairman of Messrs. Colvilles, Ltd., described the meeting as "one of the most remarkable gatherings in the history of the industry." Many of the men, whose ages ranged from 65 to 90, had served in the works for 50 years.

Rural Wool Industries.—Sheepfarmers at Aberystwyth last week were told by Mr. Tom Jones, secretary to Merioneth NFU, about the new wool factory being erected in his county. Over £25,000 had been subscribed by farmers and the factory would be turning out cloth by September. It was urged that a similar enterprise could be initiated in Cardiganshire at a cost of about £20,000.

New Plant Cuts Costs.—The introduction of new automatic plant and improvements in the manufacturing process has enabled William Freeman and Co., Ltd., of Barnsley, to reduce by approximately 20 per cent the price of Suba Seal closures. In addition, the firm has been able to extend its range of closures by the introduction of new materials resistant to acids, alkalis, oils and solvents.

Overseas News Items

A.C.S. Marketing Section.—The American Chemical Society has recently established a new section to study the marketing of chemical products.

Argentine Oil Project.—The Government of Argentina has authorised the Yacimientos Petroliferos Fiscales (State Oilfields) to spend about £25 million (422 million pesos) on large-scale developments under the national five-year plan for the oil industry.

Rumanian Exports.—Britain is included in a list of countries to which the export of Rumanian oil and oil products, cellulose, chemical products, and timber, has recently been authorised by the Ministry of Trade and Industry.

Rising Tin Charges.—No immediate price increase to consumers in this country is expected as a result of the decision by the Ministry of Supply to pay the increased price of £504 per ton (plus £4) sought by the Malayan tin producers.

China to Increase Fertiliser Output.—The Yung Li Chemical Company, China's sole producer of ammonium sulphate, is expected to increase its output in the near future, when much of the firm's apparatus and equipment, looted by the Japanese during the war, is to be restored.

Russo-Swiss Trade Pact.—Under the terms of the recently concluded trade pact between Switzerland and the Soviet Union, Switzerland will receive *inter alia*, raw materials for the chemical industry, and petroleum products, in return for machinery, machine tools, instruments and chemicals.

German Synthetic Rubber Production Ceases.—Because of the very high coal requirements and the impossibility of competing in world markets, synthetic rubber production has been discontinued in Germany. Output in the two combined zones totalled 6600 tons per annum.

French Steel Figures.—France's crude steel output totalled in January 543,000 tons, against 408,000 in December last. Total production for 1947 amounted to 5,679,000 tons, against 4,339,000 tons in 1946 and 6,220,000 tons in 1938. The Monnet Plan target is 8 million tons per annum.

U.S. Oxygen Plant.—Production of oxygen for industrial purposes has commenced at the new Stuyvesant Falls plant of Thomas A. Edison, Inc., which also manufactures medical gases. Several new products, the result of research and development work at the corporation's laboratories, will also be produced.

Colombian Sugar Record.—Sugar production in Colombia has increased steadily since 1938 and reached a record of 166,500 tons in 1947. It is expected in 1948 that Colombia will have a surplus of sugar for export.

Brazilian Pipe Line.—According to Press reports from South America, U.S. engineers have been called in by the National Petroleum Council, Brazil, to plan the laying of a dual pipe-line to carry petrol and heavy oil from Santos to S. Paulo.

Smaller Indian Shellac Exports.—Exports of Indian shellac declined from 18,169 packages in January to 11,484 packages in February. There was, however, a moderate increase in seedlac exports from 13,668 to 16,277 packages.

Japanese Antarctic Whaling.—A catch of 1321 whales has been made in Antarctic waters by the second Japanese whaling expedition since the war. It is estimated that a production of 18,000 tons of whale oil will result.

Whaling Factory For Norway.—A new Norwegian whaling factory, of 23,500 tons, is to be launched on April 15 from the shipyards of Burmeister and Wain, Copenhagen. The factory will probably be ready for the Antarctic in October.

German Chemical Plant for U.S.A.—Chemical plant from the Lippoldsberg factory—offered to the U.S.A. as reparations—has been purchased by the Resinous Products and Chemical Co., Philadelphia. The value of the plant is estimated at about $100,000.

Poland-U.S.S.R. Zone Agreement.—A trade agreement, anticipating an annual turnover of 56 million dollars, has just been concluded between the U.S.S.R. zone of Germany and Poland. The latter is to supply, among other commodities, coal, coke, benzol, coal-tar products, iron and non-ferrous metals; potash, chemicals, and scrap metal will be delivered in return.

U.S. Firm's New Chemical Division.—The Continental Ore Company of New York has announced the organisation of a chemical division to handle its expanding activities in the chemical field. The company gives as its chief reason for the move the increasing importance of chemical products in its operations. For the past 10 years the company has concentrated on the import and export of ores, minerals and metals, but today it finds industrial and agricultural chemicals playing a large part in both its present activities and future plans for development.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

V. P. SHEET METAL, LTD., Cheltenham. (M., 3/4/48.) March 3, charge to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank; charged on premises at Windsor Street, Cheltenham. *£2103. December 19, 1946.

W. EDWARDS & CO., (LONDON) LTD., scientific apparatus dealers. (M., 3/4/48.) February 27, £16,000 second deb. (supplemental to an agreement dated February 9, 1948), to Industrial and Commercial Finance Corporation, Ltd.: charged on properties, etc., as in above agreement. *£37,048. August 11, 1947.

Satisfactions

INDUSTRIAL CERAMICS, LTD., London, W. (M.S., 3/4/48.) Satisfaction March 4. £1000, reg. September 9, 1947.

L. YOUNG & CO., LTD., Southampton, sheet metal workers. (M.S., 3/4/48.) Satisfaction March 4, of deb. reg. July 18, 1936.

JAMES DAY SHEET METAL WORKERS, LTD., London, S.W. (M.S., 3/4/48.) Satisfaction March 3, of charge reg. August 26, 1947.

New Companies Registered

G. & D. Plastics, Ltd. (450,965).—Private company. Capital £1000. Manufacturers of plastics and plastic materials, etc. Directors: D. S. St. A. Butcher, K. C. J. Hulton and F. A. Nash. Reg. office: 15 F & G, Queensway, Enfield.

Geophysical Services, Ltd. (451,120).—Private company. Registered March 17. Capital £1000. To undertake in any part of the world by geophysical or any other methods, prospecting and surveying of lands for locating minerals. Water and other minerals, etc. Directors: P. D. Brown, J. Robertshaw, and A. Howells. Reg. office: 2 Lord North Street, S.W.1.

Walker Ward (Chemicals), Ltd. (451,228).—Private company. Capital £5000. Chemical manufacturers and merchants, etc. Directors: L. E. Ward, T. Walker and Felicia Walker. Reg. office: 26-7 Conduit Street, W.1.

B. Laporte (1948), Ltd. (451,126).—Private company. Capital £100. Manufacturers of chemicals and allied substances of all kinds, etc. Subscribers: L. P. O'Brien, and Wm. J. Riggett. Solicitors: Slaughter & May, 18 Austin Friars, E.C.

Metalcote of London, Ltd. (450,982).—Private company. Capital £1000. Manufacturers of enamels, paints, varnishes, polishes, colours, dyes, oils, metal platers, etc. Directors: L. H. Shepherd and W. C. Allen. Reg. office: 464 Green Lanes, Palmers Green, N.13.

Metallic Paints & Powders, Ltd. (450,799).—Private company. Capital £1000. Manufacturers of cellulose, lacquers, paints, enamels and wood finishes, metallic powders, etc. Directors: P. T. Hewing, G. W. Eade, J. F. S. Jelley and A. Beatton. Secretary: A. Beatton. Reg. office: 62 London Wall, E.C.2.

General Petroleum, Ltd. (450,844).—Private company. Capital £20,000. Distillers, refiners, importers and exporters of oils of all descriptions, lubricants, greases, tallow, petroleum products, benzol, etc. Directors: S. H. Davey and A. Jones. Solicitors: Coward Chance & Co., 165 Fenchurch Street, E.C.3.

Metallo Chemical Trust Co., Ltd. (451,233).—Private company. Capital £130,000. To acquire the whole of the issued share capital of Metallo Chemical Refining Co., Ltd., and Hemingway & Co., Ltd., manufacturers, importers and exporters of metal and chemical products, etc. Solicitors: Slaughter & May, 18 Austin Friars, E.C.2.

Technovel Development & Trading, Ltd. (451,057).—Private company. Capital £100. Manufacturers, importers and exporters of laboratory equipment of all kinds: surgical, and clinical instruments and appliances, etc. Directors: L. Beral, J. Redmond and H. E. Della-Verde. Reg. office: 26 Charing Cross Road, W.C.2.

Macwill & Co., Ltd. (450,920).—Private company. Capital £1000. Importers, exporters and manufacturers of chemical, pharmaceutical, medicinal, industrial and other preparations, etc. Subscribers: J. B. A. MacKee and Major P. N. Van der Willik. J. B. A. MacKee is the first director. Reg. office: 36 John Street, Bedford Row, W.C.1.

Chemical and Allied Stocks and Shares

STOCK market business has further contracted on the eve of the Budget, but a good impression has been created by the absence of any heavy selling. The City is now quite resigned to the voluntary limitation of dividends to last year's payments, but there is a good deal of caution, because of uncertainty whether after all Sir Stafford Cripps will also increase the Profits Tax. British Funds have been quieter awaiting the issue terms of British Electricity stock, dealings in which will have commenced by the time these notes are in print. Even if the Budget contains some surprises the disposition is to assume that markets are likely to become more active, bearing in mind that after Sir Stafford Cripps' decisions are known it should be easier to assess the position and outlook; whereas during recent weeks growing uncertainty has made for caution and restricted stock market business.

Although not maintaining best levels, shares of chemical and kindred companies have improved on balance in many instances. Imperial Chemical were 48s. 7½d., reflecting general confidence that the payment for the year is likely to be maintained at 10 per cent, even if there were another increase in the Profits Tax. B. Laporte 5s. ordinary eased to 21s., W. J. Bush were 83s. 9d., and elsewhere, Fisons have been active around 60s. On the other hand, Monsanto Chemicals 5s. ordinary reacted to 58s. 1½d. The financial results created a good impression, but there was a little disappointment that trading profits have declined, although this was more than offset by reduced tax charges, and the dividend total is 45 per cent. In other directions, British Drug Houses 5s. ordinary were 10s. 9d., and elsewhere, Glaxo Laboratories shares (which had recently also been favoured on higher dividend hopes) further reacted before rallying to £18¾ at which the yield is little more than 3½ per cent. Greeff Chemicals Holdings 5s. shares have changed hands around 15s. 6d. British Aluminium eased to 46s. 3d. following the company's decision not to pay a higher dividend than last year's 10 per cent. The yield on this basis is slightly under 4½ per cent, but the market believes that the company's profits are continuing on the up-grade and that in respect of the current year, earnings on the shares will again be substantially in excess of the 10 per cent dividend.

Limitation of dividends to last year's rates will naturally rob industrial shares of much of their speculative element and price movements may therefore tend to be more sedate than hitherto. Nevertheless, the speculative element will not be entirely absent. Share values may tend to be influenced more by the rate of dividend earned than by the actual dividend payment.

Iron and steel shares recorded only small movements. Although it is believed that many iron and steel companies are earning higher profits, the market is assuming that in view of the limitation request, dividends will be kept at last year's rates. Nevertheless, yields are attractive in many cases. Moreover, it is assumed in the market that if nationalisation is to be brought in and compensation for iron and steel shareholders is on a fair basis it will have to be based on a higher level than current market values of the shares.

Boots Drug at 53s. 3d. have been firmer. British Glues and Chemicals were favoured and rallied to 21s. 3d., it being pointed out that these 4s. shares yield nearly 4¾ per cent on last year's 25 per cent dividend, which is expected to be repeated with earnings again well in excess of this rate. There has been a moderate rally in oil shares, Anglo-Iranian strengthening to £8¾, with Shell 76s. 3d., while C. C. Wakefield were favoured because of the good yield, and improved to 78s. 1½d. Triplex Glass improved to 28s. 3d. on the big increase in exports of safety glass.

COMPANY NEWS

The nominal capital of **Tretol, Ltd.** chemical manufacturers, etc., 12 North End Road, London, N.W.7, has been increased beyond the registered capital of £5000 by £5000 in 100,000 1s. ordinary shares.

Ciba A.G.—The Basle chemical concern reports for last year a considerably increased net profit of 14,973,232 (11,245,045) Swiss francs. It is proposed to pay a net dividend of 49 francs on the ordinary shares of 500 francs each.

NATIONALISATION

IT is impossible for anyone who realises that a cheap and adequate supply of electricity is essential to the future prosperity of our country to view with equanimity the transfer of this great industry to politically controlled nationalised ownership and management, but we can at least be proud of the position of the undertaking which your company is handing over on April 1.—Major H. Richardson, chairman of the London Power Co., Ltd., at the company's annual general meting in London.

Prices of British Chemical Products

THE market generally has been a little less active due to seasonal influences, but the volume of inquiry is certainly greater than is customary for the period, and the movement against contract delivery specifications remains on a substantial scale. Following the recent Board of Trade announcement, an Order has now been made revising the existing maximum selling prices prescribed for industrial alcohol and solvents derived therefrom. The maximum price for acetic acid, 80 per cent pure and technical, is £7 10s. per ton higher, commercial glacial £9 per ton higher, and methylated spirit has been increased by 6d. and 6½d. per gallon. On the other hand, the maximum price for acetone has been reduced by £10 per ton. The new prices operate as from April 1. Up to the time of writing there have been no other important price changes reported. In the coal-tar products section the position is unchanged, with a ready outlet for all available supplies.

MANCHESTER.—The Manchester chemical market has been under the influence of holiday conditions during the greater part of the past week, and the actual turnover as far as new business is concerned has been appreciably smaller. However, in the bread-and-butter lines, a resumption of work at the consuming end has been accompanied by a steady call for deliveries of a wide range of chemicals, and there has been a gradual re-awakening of new home and export buying, although in the latter it has not been easy to arrange reasonably early shipments in many lines. There is a good movement of supplies of many of the fertiliser materials, and in the tar produucts section a steady demand for both the light and heavy kinds is reported.

Price Changes

Rises: Oxalic acid, sodium phosphate, acetic acid, methylated spirit, and lithopone.
Reductions: White lead, and acetone.

General Chemicals

Acetic Acid.—Maximum prices per ton: 80% technical, 1 ton, £64; 80% pure, 1 ton, £66; commercial glacial 1 ton £79; delivered buyers' premises in returnable barrels: £4 10s. per ton extra if packed and delivered in glass.

Acetone.—Maximum prices per ton, 1/5 tons, £76 10s.; single drums, £77 10s.; delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each. For delivery in non-returnable containers of 40/50 gallons, the maximum prices are £3 per ton higher. Deliveries of less than 10 gallons free from price control.

Alum.—Loose lump, £16 per ton, f.o.r. MANCHESTER: £16 10s.

Aluminium Sulphate.—Ex works, £11 10s. per ton d/d. MANCHESTER: £11 10s.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate. — MANCHESTER: £41 per ton d/d.

Ammonium Carbonate.—£42 per ton d/d in 5-cwt. casks. MANCHESTER: Powder, £43 d/d.

Ammonium Chloride. — Grey galvanising, £22 10s. per ton, in casks, ex wharf. Fine white 98%, £21 to £25 per ton. See also Salammoniac.

Ammonium Persulphate.—MANCHESTER: £5 per cwt. d/d.

Antimony Oxide.—£162 10s. per ton.

Arsenic.—Per ton, £40 5s. to £41 5s., according to quality, ex store.

Barium Carbonate.—Precip., d/d; 2-ton lots, £25 15s. per ton, bag packing, ex works.

Barium Chloride.—98/100% prime white crystals, 5-ton lots, £26 per ton, bag packing, ex works.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £26 10s. per ton d/d; 2-ton lots, £26 15s. per ton.

Bleaching Powder.—Spot, 35/37%, £11 to £11 10s. per ton in casks, special terms for contract.

Borax.—Per ton for ton lots, in free 1-cwt. bags, carriage paid: Commercial, granulated, £30; crystals, £31; powdered, £31 10s.; extra fine powder, £32 10s. B.P., crystals, £39; powdered, £39 10s.; extra fine, £40 10s. Borax glass, per ton in free 1-cwt. waterproof paper-lined bags, for home trade only, carriage paid: lump, £77; powdered, £78.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid: Commercial, granulated, £52; crystals, £53; powdered, £54; extra fine powder, £56. B.P., crystals, £61; powder, £62; extra fine, £64.

Calcium Bisulphide.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid, £5 15s. per ton, ex store.

Charcoal, Lump.—£25 per ton, ex wharf. Granulated, £30 per ton.

Chlorine, Liquid.—£23 per ton, d/d in 16/17-cwt. drums (3-drum lots).

Chrometan.—Crystals, 5⅝d. per lb.

Chromic Acid.—1s. 10d. to 1s. 11d. per lb., less 2½%, d/d U.K.

Citric Acid.—Controlled prices per lb., d/d buyers' premises. For 5 cwt. or over, anhydrous, 1s. 6¾d., other, 1s. 5.; 1 to 5 cwt., anhydrous, 1s. 9d., other, 1s. 7d. Higher prices for smaller quantities.

Copper Carbonate.—MANCHESTER: 1s. 8d. per lb.

Copper Oxide.—Black, powdered, about 1s. 4½d. per lb.

Copper Sulphate.—£42 10s. per ton f.o.b., less 2%, in 2-cwt. bags.

Cream of Tartar.—100%, per cwt., from 201s. to 205s. per cwt. lots, d/d.

Formaldehyde.—£28 to £29 per ton in casks, according to quantity, d/d. MANCHESTER: £30 10s.

Formic Acid.—85%, £55 per ton for ton lots, carriage paid.

Glycerine.—Chemically pure, double distilled 1260 s.g., 123/1 per cwt. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; carriage paid for bulk lots.

Hydrochloric Acid.—Spot, 7s. 6d. to 8s. 9d. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Hydrogen Peroxide.—1s. 0½d. per lb. d/d, carboys extra and returnable.

Iodine.—Resublimed B.P., 10s. 4d. to 14s. 6d. per lb., according to quantity.

Lactic Acid.—Pale tech., £70 per ton; dark tech., £60 per ton ex works; barrels returnable.

Lead Acetate.—White, 110s. to 115s. per cwt., according to quantity.

Lead Nitrate.—About £115 per ton d/d in casks. MANCHESTER: £115.

Lead, Red.—Basic prices per ton: Genuine dry red lead, £106; orange lead, £118. Ground in oil: red, £132; orange, £144. Ready-mixed lead paint: red, £140; orange, £152 (subject to increase of £1 10s. per ton).

Lead, White.—Dry English, in 8-cwt. casks, £116 10s. per ton. Ground in oil, English, in 5-cwt. casks, £141 per ton.

Litharge.—£103 10s. to £106 per ton.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £18 5s.

Magnesium Chloride.—Solid (ex wharf), £27 10s. per ton.

Magnesium Sulphate.—£12 to £14 per ton.

Mercuric Chloride.—Per lb., for 2-cwt. lots, 7s. 6d.; smaller quantities dearer.

Mercurous Chloride.—8s. 10d. to 9s. per lb., according to quantity.

Mercury Sulphide, Red.—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 4s. 10d. per gal.; pyridinised 64° O.P. 100 gals., 4s. 11d. per gal.

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—£110 to £121 per ton packed in free 5-cwt. casks. MANCHESTER: £6 7s. per cwt.

Paraffin Wax.—Nominal.

Phosphorus.—Red, 3s. per lb. d/d; yellow, 1s. 10d. per lb. d/d.

Potash, Caustic.—Solid, £65 10s. per ton for 1-ton lots; flake, £76 per ton for 1-ton lots. Liquid, d/d, nominal.

Potassium Bichromate.—Crystals and granular, 9⅝d. per lb.; ground, 10⅝d. per lb., for not less than 6 cwt.; 1-cwt. lots, ¼d. per lb. extra.

Potassium Carbonate.—Calcined, 98/100%, £64 per ton for 1-ton lots, ex store; hydrated, £58 per 1-ton lots.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Iodide.—B.P., 8s. 8d. to 12s. per lb., according to quantity.

Potassium Nitrate.—Small granular crystals, 76s. per cwt. ex store, according to quantity.

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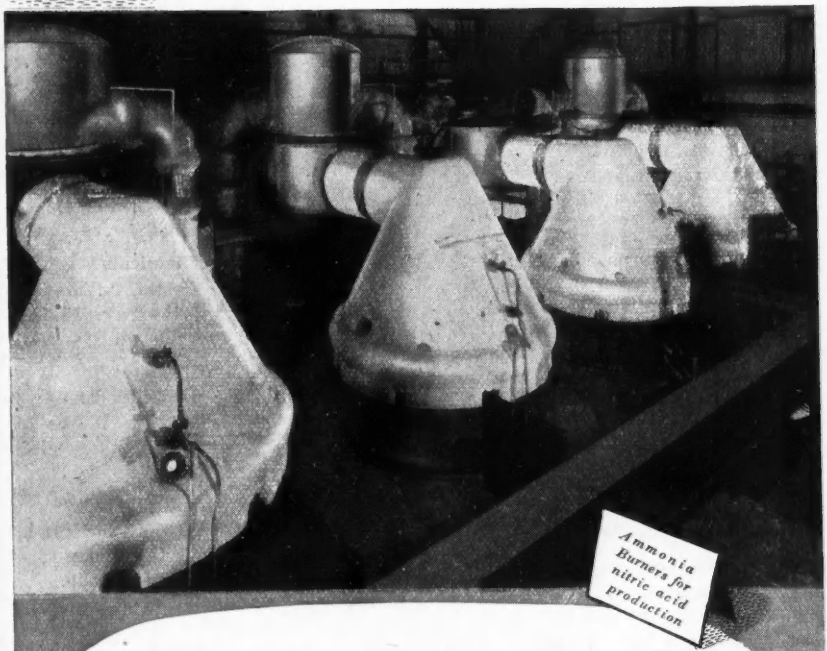
to Nitrogenous Chemicals & Fertilisers



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Potassium Permanganate.—B.P., 1s. 8½d. per lb. for 1-cwt. lots; for 3 cwt. and upwards, 1s. 8d. per lb.; technical, £7 14s. 3d. to £8 6s. 3d. per cwt., according to quantity d/d.

Potassium Prussiate.—Yellow, nominal.

Salammoniac.—First lump, spot, £48 per ton; dog-tooth crystals, £50 per ton; medium, £48 10s. per ton; fine white crystals, £21 to £25 per ton, in casks, ex store.

Salicylic Acid.—MANCHESTER: 1s. 10d. to 3s. 1d. per lb. d/d.

Soda, Caustic. — Solid 76/77%; spot, £18 4s. per ton d/d.

Sodium Acetate.—£42 per ton, ex wharf.

Sodium Bicarbonate.—Refined, spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 8d. per lb.; anhydrous, 7½d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite. — Powder, 60/62%, £28 7s. 6d. per ton d/d in 2 ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2-cwt. free bags.

Sodium Chlorate.—£45 to £47 per ton.

Sodium Hyposulphite.—Pea crystals 22s. 6d. per cwt. (2-ton lots); commercial, 1-ton lots, £17 per ton carriage paid. Packing free.

Sodium Iodide.—B.P., for not less than 28 lb., 10s. 2d. per lb.

Sodium Metaphosphate (Calgon).—Flaked, loose in metal drums, £103 ton.

Sodium Metasilicate.—£19 5s. per ton, d/d U.K. in ton lots.

Sodium Nitrite.—£22 10s. per ton.

Sodium Percarbonate.—12½% available oxygen, £7 11s. 9d. per cwt. in 1-cwt. drums.

Sodium Phosphate.—Di-sodium, £32 10s. per ton d/d for ton lots. Tri-sodium, £62 per ton d/d for ton lots (crystalline).

Sodium Prussiate.—9d. to 9½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Sulphate (Glauber Salt).—£8 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. Spot £4 11s. per ton d/d station in bulk. MANCHESTER: £4 15s. per ton d/d station.

Sodium Sulphide. — Solid, 60/62%, spot, £23 per ton, d/d, in drums; broken, £23 15s. per ton, d/d, in casks.

Sodium Sulphite.—Anhydrous, £29 10s. per ton; pea crystals, £20 10s. per ton d/d station in kegs; commercial, £12 to £14 per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £14 12s. 6d. to £16 17s. 6d., according to fineness.

Sulphuric Acid.—168° Tw., £6 10s. 2d. to £7 10s. 2d. per ton; 140° Tw., arsenic-free, £5 2s. 6d. per ton; 140° Tw., arsenious, £4 15s. per ton. Quotations naked at sellers' works.

Tartaric Acid.—Per cwt., for 10 cwt. or more, £15 8s.; 5 to 10 cwt., £15 9s. 6d.; 2 to 5 cwt., £15 11s.; 1 to 2 cwt., £15 13s. Less than 1 cwt., 3s. 1d. to 3s. 3d. per lb. d/d, according to quantity.

Tin Oxide.—1-cwt. lots d/d £25 10s.

Zinc Oxide.—Maximum prices per ton for 2-ton lots, d/d; white seal, £75 10s.; green seal, £74 10s.; red seal, £73.

Zinc Sulphate.—No quotation.

Rubber Chemicals

Antimony Sulphide.—Golden, 3s. to 4s. per lb. Crimson, 2s. 7½d. to 3s. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Barytes.—Best white bleached, £8 3s. 6d. per ton.

Cadmium Sulphide.—6s. to 6s. 6d. per lb.

Carbon Bisulphide.—£37 to £41 per ton, according to quality, in free returnable drums.

Carbon Black.—6d. to 8d. per lb, according to packing.

Carbon Tetrachloride.—£50 10s. to £53 10s. per ton, according to quantity.

Chromium Oxide.—Green, 2s. per lb.

India-rubber Substitutes.—White, 10 5/16d. to 1s. 5¾d. per lb.; dark, 10½d. to 1s. per lb.

Lithopone.—30%, £33 12s. 6d. per ton.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, "Rupron."—£20 per ton.

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£49 per ton.

Vermilion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Nitrogen Fertilisers

Ammonium Phosphate.—Not quoted—temporarily unobtainable.

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Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, in January, £10 5s., rising by 1s. 6d. per ton per month to March, 1948.

Calcium Cyanamide.—Nominal; supplies very scanty.

Concentrated Fertilisers. — Per ton d/d farmer's nearest station, I.C.I. No. 1 grade, where available, £14 18s. 6d.

"Nitro-Chalk."—£10 4s. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean super-refined for 6-ton lots d/d nearest station, £17 5s. per ton; granulated, over 98%, £16 per ton.

Coal-Tar Products

Benzol.—Per gal. ex works: 90's, 2s. 6d.; pure, 2s. 8½d.; nitration grade, 2s. 10½d.

Carbolic Acid. — Crystals, 11½d. per lb. Crude, 60's, 3s. 6d. to 4s. MANCHESTER: Crystals, 9½d. to 11½d. per lb., d/d; crude, 4s. 3d., naked, at works

Creosote.—Home trade, 6½d. to 9¾d. per gal., according to quality, f.o.r. maker's works. MANCHESTER: 6½d. to 9¾d. per gal.

Cresylic Acid.—Pale, 97%, 3s. 6d. per gal.; 99%, 4s. 2d.; 99.5/100%, 4s. 4d. American, duty free, 4s. 2d., naked at works. MANCHESTER: Pale, 99/100%, 4s. 4d. per gal.

Naphtha.—Solvent, 90/160°, 2s. 10d. per gal. for 1000-gal. lots; heavy, 90/190°, 2s. 4d. per gal. for 1000-gal. lots, d/d. Drums extra; higher prices for smaller lots. Controlled prices.

Napthalene.—Crude, ton lots, in sellers' bags, £8 1s. to £12 13s. per ton according to m.p.; hot-pressed, £14 15s. to £15 14s. per ton, in bulk ex works; purified crystals, £28 to £43 5s. per ton. Controlled prices.

Pitch.—Medium, soft, home trade, 100s. per ton f.or. suppliers' works; export trade, £7 10s. per ton f.o.b. suppliers' port. MANCHESTER: 100s. f.o.r.

Pyridine.—90/140°, 18s. per gal.; 90/160°, 14s. MANCHESTER: 16s. to 20s. per gal.

Toluol.—Pure, 3s. 2¼d. per gal.; 90's, 2s. 4d. per gal. MANCHESTER: Pure, 3s. 2¼d. per gal. naked.

Xylol.—For 1000-gal. lots, 3s. 3½d. to 3s. 6d. per gal., according to grade, d/d.

Wood Distillation Products

Calcium Acetate.—Brown, £15 per ton; grey, £22.

Methyl Acetone.—40/50%, £56 to £60 per ton.

Wood Creosote.—Unrefined, from 3s. 6d per gal., according to boiling range.

Wood Naphtha.—Miscible, 4s. 6d to 5s. 6d. per gal.; solvent, 5s. 6d. to 6s. 6d. per gal.

Wood Tar.—£6 to £10 per ton.

Intermediates and Dyes (Prices Nominal)

m-**Cresol** 98/100%.—Nominal.

o-**Cresol** 30/31° C.—Nominal.

p-**Cresol** 34/35° C.—Nominal.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb.; 66/68° C., 1s.

p-**Nitraniline.**—2s. 5d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.

Nitronaphthalene.—1s. 2d. per lb.; P.G. 1s. 0½d. per lb.

o-**Toluidine.**—1s. per lb., in 8/10-cwt. drums, drums extra.

p-**Toluidine.**—2s. 2d. per lb., in casks.

m-**Xylidine Acetate.**—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON.—March 31. For the period ending May 1, 1948 (April 24, 1948, for refined oils). Per ton, naked, ex mill, works or refinery, and subject to additional charges according to package; LINSEED OIL, crude, £200. RAPESEED OIL, crude, £109; washed £112. COCONUT OIL, crude, £106 refined deodorised, £112; refined hardened deodorised, £116. PALM KERNEL OIL, crude, £105 10s., refined deodorised, £112; refined hardened deodorised, £116. PALM OIL (per ton c.i.f.), in returnable casks, £99 5s.; in drums on loan, £98 15s., in bulk, £97 15s. GROUNDNUT OIL, crude, £110 10s.; refined deodorised, £114, refined hardened deodorised, £118. WHALE OIL, refined hardened, 42 deg., £117; refined hardened, 46/48 deg., £118. ACID OILS, Groundnut, £94; soya, £92; coconut and palm-kernel, £97 10s. ROSIN: Wood, 40s. 6d. to 48s.; gum, 56s. to 62s. 6d. per cwt., ex store, according to grade. TURPENTINE, American, 87s. per cwt. in drums or barrels, as imported (controlled price).

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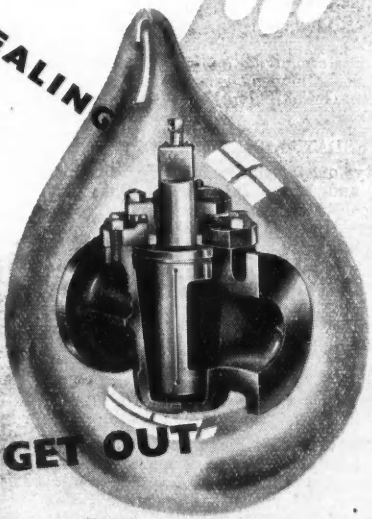

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Next Week's Events

MONDAY, APRIL 5 and TUESDAY, APRIL 6

Society of Chemical Industry (London Section). Mathematics Lecture Theatre, Royal College of Science, Huxley Building, Exhibition Road, South Kensington, S.W.7. Symposium on "Detergents, Wetting and Emulsifying Agents." Monday: "Synthetic Detergents," Afternoon session, 2.15 p.m., Evening session, 6.15 p.m. Tuesday: "Wetting Agents and Auxiliary Products," Afternoon session, 2.15 p.m., Evening session, 6.15 p.m.

TUESDAY, APRIL 6

Society of Chemical Industry (Chemical Engineering Group). Apartments of Geological Society, Burlington House, Piccadilly, W.1., 5.30 p.m. J. G. Pearce: "Recent Developments in Cast-Iron." (Food Group and Glasgow Sections) and Royal Institute of Chemistry. Gas Showrooms, Sauchiehall Street, Glasgow, 2 p.m. Opening of Ministry of Food B.I.O.S. Exhibition by Sir William Scott. 2.30 p.m. E. C. Bate-Smith: "Refrigeration in Germany." H. J. Bunker: "Wartime Production of Food Yeast in Germany." 7 p.m. J. F. Heane: "German Albumen Substitutes," C. B. Brown: "German Synthetic Detergents."

WEDNESDAY, APRIL 7

Society of Chemical Industry, Chemical Society and Royal Institute of Chemistry. (Liverpool Sections.) Nicholson Lecture Theatre, University, Liverpool, 7 p.m. Demonstration of Scientific Apparatus.

Society of Public Analysts. Rooms of the Chemical Society, Burlington House, Piccadilly, W.1., 7 p.m. Extraordinary meeting. 7.15 p.m. F. J. Macdonald: "The Freezing Point of Bulk Milk"; W. Westwood and A. Mayer: "The Determination of Cerium in Cast-Iron"; W. J. Stainsby: "The Determination of Linoleic Acid in Edible Fats."

Institute of Fuel. Engineers' Club, Manchester, 1.30 p.m. Annual General Meeting. 2.30 p.m. Dr. H. E. Crossley: "External Deposits on the Heating Surface of Boiler Plant."

Northampton Polytechnic. St. John Street, London, E.C.1, 7 p.m. Dr. J. H. Partridge: "The Manufacture and Properties of Glass."

THURSDAY, APRIL 8

Institute of Metals. 4 Grosvenor Gardens, S.W.1, 6 p.m. Annual general meeting. 7 p.m. Prof. N. F. Mott and Dr. J. H. Mitchell: "The Oxidation of Metals."

Institute of Physics. Anatomy Lecture Theatre, King's College, Strand, W.C.2, 5.30 p.m. Dr. V. E. Cosslett: "Recent Advances in Electron Microscopy in Great Britain."

Chemical Society (Manchester Section). Chemistry Department, Manchester University, 6.30 p.m. Meeting for the reading of short, original papers.

FRIDAY, APRIL 9

Oil and Colour Chemists' Association (Manchester Section). Engineers' Club, Manchester, 6.30 p.m. Annual general meeting.

Approval of Horticultural Chemicals.—The Ministry of Agriculture and the Department of Agriculture for Scotland are now receiving from manufacturers and authorised selling agents, applications for the official approval of proprietary DNC-petroleum oil winter washes, calomel, 4 per cent calomel dusts, slug baits based on metaldehyde, banding greases and prepared grease bands. Application forms may be obtained from the Secretary of the Advisory Committee, Plant Pathology Laboratory, Milton Road, Harpenden, Herts.

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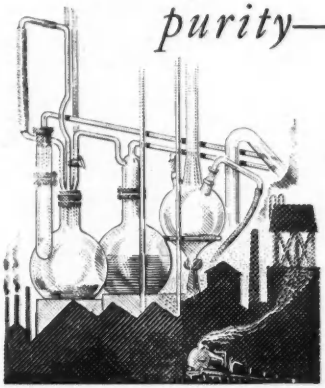

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SITUATIONS VACANT

None of the vacancies in these columns relates to a man between the ages of 18 *and* 50 *inclusive, or a woman between the ages of* 18 *and* 40 *inclusive, unless he or she is exempted from the provisions of the Control of Engagement Order, or the vacancy is for employment exempted from the provisions of that order.*

BOOTS PURE DRUG CO. LTD. invite applications from Chemists with administrative experience of Analytical Control work, for appointment to a position leading directly to that of Head of the Analytical Control Division of the Company. The division comprises laboratories engaged in Chemical, Physical, Pharmacological and Bacteriological methods of control, with a staff of upwards of 120. Its principal function is the routine control of raw materials, drugs and galenicals, and the medical and pharmaceutical products issued by the Company.

The applicant must have a sound knowledge of the basic principles governing methods of control in the above fields, possess high professional qualifications, including the Fellowship of the Royal Institute of Chemistry, and administrative and organisational ability. He should be between 35 and 45 years of age, but due consideration will be given to applicants of outstanding ability and experience outside this age group.

Salary, conditions of employment, pension, housing, etc., will be dealt with on interview.

Applications, giving age, qualifications and experience, should be addressed to THE SECRETARY, BOOTS PURE DRUG CO. LTD., Station Street, Nottingham, marked PERSONAL.

CHEMICAL Engineer wanted as Manager for chemical works in the Midlands. Position offers first-class opportunities and carries commensurate salary. Applicants must have good broad experience of manufacture of chemicals and be capable of planning extensions and taking full charge. Write, giving details of experience, age and indication of salary required. Box No. 2632, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

SITUATIONS VACANT

ASSISTANT Chemists required by old-established firm developing new processes for the manufacture of synthetic organics chemicals at their new works in the Midlands. Excellent opportunities are offered for young men of drive and ability. Experience in gas analytical work and a knowledge of manufacture of synthetic organic chemicals desirable but not essential. Salary, £350-£450 per annum. Apply in confidence, giving full particulars of qualifications and experience, to Box No. 2628, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

PLANT Chemists urgently required for Process Plant Operation by large company operating in the Middle East. Applicants need not be Graduates but should have had a chemical training up to Inter. B.Sc. or National Certificate Standard with experience of shift work in either a gas, coke oven or chemical works. Age not over 30. Salary in sterling between £540 and £600 per annum, plus generous allowances in local currency, with free furnished bachelor accommodation, passages out and home, medical attention, also kit allowance and Provident Fund benefits. Apply, stating age, qualifications and experience, etc., to Dept. F.22, Box 1021, 191, Gresham House, E.C.2.

PROGRESSIVE London dyestuff exporters with well established overseas connections have vacancy for Manager to take full charge of Department. Remuneration: salary and commission which on present trading figures amounts to approx. £5,000 per annum and could be increased considerably. Only colourists with previous technical and commercial experience, able to work on own initiative and having knowledge of Eastern and European Markets need apply, giving full particulars in confidence to Box No. 2629, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

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March 19th, 1948.

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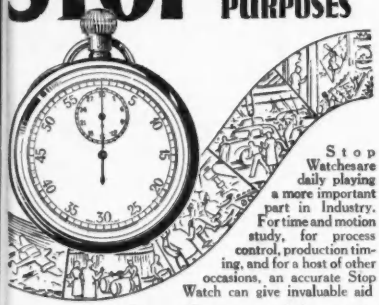

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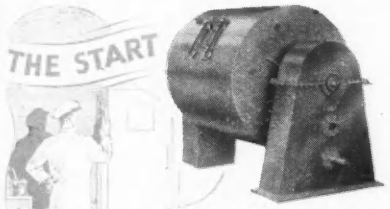

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